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CANNELTON,

PERRY COUNTY, IND.,

AT THE INTERSECTION OF THE EASTERN MARGIN OF THE

ILLINOIS COAL BASIN,

BY THE

OHIO RIVER;

ITS NATURAL ADVANTAGES AS A SITE FOR

MANUFACTURING.

Published by the American Cannel Coal Company.

LOUISVILLE:

PRINTED AT THE JOURNAL OFFICE.

1850.

The object of this publication is to attract labor, skill, machinery and capital to Cannelton from less favorable positions abroad. Copies will be sent where there is little knowledge of the physical features of the Mississippi Valley, and where the enterprises of individuals here may be regarded with distrust. It was, therefore, deemed proper to submit this pamphlet to the examination of those whose official station and public services were widely known, and whose opinions would be entitled to public confidence.

The following letters from Hon. H. L. Ellsworth, Dr. D. D. Owen, Hon. R. D. Owen, Capt. C. A. Fuller, and Lieut. Col. Stephen H. Long are sufficient for the purpose in view. The able reports of Mr. Ellsworth, while Commissioner of Patents, on the resources of this country, evinced a vast amount of labor and care in investigations on this subject. Dr. Owen, now in the service of the U. S. as Geologist, who resides in the mineral district of Indiana, and whose contributions to geological science have made him known over the world, will be regarded as unquestionable authority. Hon. R. D. Owen was a manufacturer in Scotland, and familiar with the advantages of the chief seats of manufacturing industry in Europe. As a leading Representative in the Congress of the United States, and as the active member in the Board of Regents of the Smithsonian Institution, he has had every opportunity of forming accurate opinions on the relative resources of his own district. Capt. Fuller has been in the service of the Topographical and Engineer Departments of the U, S. for the last thirteen years and personally made the topographical surveys at Cannelton. Col. Long entered the Engineer Department of the U. S. in 1814. In 1819-20 he commanded the U. S. Exploring Expedition to the Rocky Mountains, and a similar expedition around the sources of the Mississippi, in 1823. The histories of those expeditions, which were published by Messrs. Carey & Hart of Philadelphia, in four octavo volumes, with maps and plates, will show that Col. L. has had a better opportunity for extensive researches in the country situated between the Gulf of Mexico and the northern boundary of the United States, than any other individual, while the description given in the volumes alluded to, enforce conviction that he is not only a careful and attentive observer of the character, aspect, &c., of the regions through which he travelled, but that the accounts given by him and his coadjutors in the expeditions, abound in adequate descriptions (geographical, geological, botanical, and zoological) of the country and its resources both in a special and in a general point of view.

Since that period he has located the Baltimore and Ohio Rail Road and other important routes on the seaboard and in this valley, and may be regarded as the pioneer of Rail Road enterprise in the United States. Perhaps he has seen more active service, and over a more extensive surface than any living engineer.

(See last two pages of cover.)

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CANNELTON,

PERRY COUNTY, IND.,

AT THE INTERSECTION OF THE EASTERN MARGIN OF THE

ILLINOIS COAL BASIN,

BY THE

OHIO RIVER;

ITS NATURAL ADVANTAGES AS A SITE FOR

MANUFACTURING.

Hamilton Smith

Published by the American Cannel Coal Company,

LOUISVILLE:

PRINTED AT THE JOURNAL OFFICE.

1850.

Louisville, May 1, 1850.

Sir: I am instructed by the Board of Directors of the American Cannel Coal Company to request you to collect and prepare for publication the most important of your articles on the advantages for manufacturing the great staples of the South and West at the coal beds on the Lower Ohio, and to add thereto the special claims of Cannelton to the attention of capitalists, mechanics and manufacturers.

STEPHEN H. LONG,
Pres. A. C. C. Co.

To Hamilton Smith, Esq., Louisville.

Louisville, May 20, 1850.

Sir: In accordance with the request of the Directors of the A. C. C. Co., I have collected and arranged for publication the accompanying papers on the subject of Western manufactures, and on the importance of the coal measures of the central West. I have added thereto copies of the charters for manufacturing purposes at Cannelton, and the reports and letters of geologists, engineers, and others, in reference to the peculiar advantages of that point for manufacturing.

In justice to myself, I remark, that most of these papers were written hastily and at intervals; that I had no practical knowledge in any department of manufacturing, and that I found great difficulty in obtaining from abroad all the data from which we might calculate the advantages of our own position. There are some slight discrepances in the data used. These were obtained at different times and from different sources, and changes have been of constant occurrence. I have not the leisure to make a new series of calculations on the facts as they now exist: indeed, as these are subject to further change, the labor of correction would be almost useless.

The business of manufacturing in this valley is comparatively new, and very many of the circumstances and accessories which attend, and will attend it are also new. Some of these we may now regard as too important, while we attach too little importance to others. All that we should do now is to gather and publish all the facts within our reach, that bear, or seem to bear on the subject, and leave the correction of our errors and the elaboration of systematic treatises to those who follow and who will have the tests of experience and the opportunities for comparison.

Very respectfully, your ob't serv't,

HAMILTON SMITH.

To Col. Stephen H. Long, Louisville, Ky.,
President of the Am Can. Coal Company.

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CIRCULAR

OF THE AMERICAN CANNEL COAL COMPANY.

MAY, 1850.

Within the last few years, the town of Cannelton, on the lower Ohio, has attracted much notice at home and abroad. Distinguished geologists, civil engineers, and manufacturers have pronounced it the most eligible site for a manufacturing city of any now known. Some have predicted that it will eventually be "the great manufacturing city of the world." The press has favorably noticed the place and the enterprises there in progress, and the public mind seems to regard the whole movement as legitimate and in the hands of those who are making permanent investments and not a fancy stock.

This site naturally embraces an area of perhaps ten miles square, and fronts Deer creek on the east, Anderson river on the west, and the Ohio river on the south. Of this area of 64,000 acres, probably over 10,000 acres are alluvial, and of a grade towards the river sufficiently easy to be eligible sites for mills and work shops. Nearly the whole of this is above ordinary floods, and the larger portion is *never* covered with water. The remaining portion of this area is chiefly in ridges of from fifty to several thousand acres, rising from 50 to 300 feet above the plane of high water. These are covered with a luxuriant growth of the most valuable timber, and are filled with strata of bituminous and cannel coal, building stone, fire and whetstone, fire-clay or potters' marle, which are convenient of access and are worked horizontally with ease and safety.

A full examination of geological charts, and mining and manufacturing statistics warrant the opinion that this site, in natural advantages for manufacturing, is unsurpassed and perhaps unequalled.

CANNELTON now presents the most prominent position on this site. It is nearly in the center of the front, and, by its facilities of access to the coal and minerals through the valleys of Dozier and Castleberry it will probably retain its relative position. The stockholders of the American Cannel Coal Company, whose large property lies in and contiguous to Cannelton, are now so often called upon for information

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in reference to their operations at Cannelton, that the Directors deem it advisable to present to the public, not only a full description of the place and its improvements, but the leading facts and arguments on which its claims to importance rest.

The Directors are STEPHEN H. LONG,
WILLIAM RICHARDSON,
HAMILTON SMITH,
JAMES C. FORD,
HENRY A. GRISWOLD,
E. HUTCHINGS,
} *Louisville, Ky.*
JAMES BOYD, *Cannelton.*
MAUNSEL WHITE, *New Orleans.*
CHARLES T. JAMES, *Providence, R. I.*

The Officers are STEPHEN H. LONG, President.
HENRY A. GRISWOLD, Secretary.
WILLIS RANNEY, Treasurer.

The inquiries of mechanics, manufacturers and capitalists, relative to Cannelton are as to

1. The healthiness of its site;
2. The purity and supply of water for household and manufacturing purposes;
3. The character and cost of fuel and building materials;
4. The cost and means of obtaining an ample supply of food;
5. The facilities of intercommunication;
6. The price of lots in the town, and of lands in the vicinity;
7. The amount of State and local taxes;
8. The advantages for educating children, and the opportunities of enjoying religious privileges;
9. The character of the works already in progress, the demand for labor, and the chances, probabilities or certainties of a rapid increase of population and appreciation of property;
10. The opportunities of making advantageous investments in and near Cannelton;
11. The branches of business most appropriate to the place, and which would be most likely to yield the largest profits.

1. THE HEALTHINESS OF THE SITE.—Coal districts are proverbially healthy. This is considered peculiarly so. The drainage is natural and rapid. The small streams that penetrate the hills are confined to

narrow channels and run over rocky beds. The nearest low and wet lands are at some distance, on the other side of the river, and opposite the direction of the prevalent summer winds.

The free use of bituminous coal, as is believed, has a decided tendency to neutralize malaria.

The miners are remarkable for good health, and the rosy looks of their children in the schools afford the most conclusive evidence of the healthiness of their homes.

Prior to the commencement of the cotton mill, the statistics of mortality here compared favorably with those of the most healthy sections of the country. Such, however, has been the influx of ordinary laborers for the last year, and so insufficient have been the means of accommodation, that many cases of sickness have been the result of crowded apartments and careless, intemperate habits.

The company has done all in its power to provide shelter and enforce sanatory rules; yet it has been found exceedingly difficult to induce the lower classes of laborers and emigrants to avoid exposure and to pay the proper attention to diet and cleanliness.

At the lower part of the town there were a few cases of fever and ague during last summer. The causes of these, however, were temporary and are being removed.

At a few positions on Deer creek and Anderson river, it will be unsafe to locate residences until the lands have been cleared and the decaying vegetable matter has been removed.

2. THE PURITY AND SUPPLY OF WATER FOR DOMESTIC AND MANUFACTURING PURPOSES.—The permanent springs on the hill sides are sufficient in permanency and volume, for ordinary domestic and stock purposes. Wells sunk below the sandstone afford an abundant supply of *soft* water. On the first and second banks of the river the wells are sunk into a thick stratum of gravel, through which the river water rapidly passes and is perfectly filtrated. These wells rise and fall with, and are as inexhaustible as the river.

It is supposed that wells sunk below the sandstone will furnish an abundant supply to paper and other mills that require pure and soft water.

On the hill back of the town, is a natural site for a reservoir, 250 feet above high water, and about 800 yards from the river bank, and the company intend to establish water works as soon as the number of inhabitants will justify the cost. From the natural convenience

of the site referred to and the low cost of power, the Cannelton hydrants can be supplied at very low rates.

About a mile from the town, in the valley of Castleberry creek, is a spring of mineral water, resembling that at the Grayson springs of Kentucky which are under the coal formation. This spring is a place of healthy and agreeable resort in the summer, and the company are now improving the grounds around it.

On this margin of the coal series, and north of Cannelton, are many sulphur and chalybeate springs, said to equal those of Virginia. It is quite probable that the same will be found in Perry county.

3. THE SUPPLY, CHARACTER, AND COST OF FUEL AND BUILDING MATERIALS.—For the facts on these points reference is made to the opinions and statements of Dr. Jackson, Dr. Hall, Prof. Johnson, and of Messrs. Lawrence, Ridgeway, Eastin, McGregor and others, in the appendix. In the report of Dr. D. Dale Owen to the Legislature of Indiana, are full statements of the topographical and geological features of this coal series. The outlines of this have been mapped out by him and adopted by Prof. Lyell and other eminent geologists. The margin of this series may be seen on the outline map fronting page 60 of the appendix.

It is, therefore, assumed that these strata of sandstones, clays, coal, and perhaps iron-stone, extend, on the same plane, from the Ohio river at Cannelton, as far north, at least, as the Wabash river above Coal creek, and that they are to be found in every intermediate part of the line except where they have been washed out by the action of water on the surface.

On the property of the company, the lower stratum of coal has been opened and worked in three separate ridges; openings that have been made in more remote localities, show thicker and purer coal, which, however, will not be worked until access to it has been made by the working out of chambers and drifts in front and on the same plane.

It is supposed that, from the openings on the western front of the property of the company, the "adit levels" would run northwardly along the coal stratum, and without a break for fifteen miles, where they would be cut by one of the forks of Anderson river, and where the coal and snperincumbent sandstone distinctly "crops out." These adit levels and the coal chambers on either side could be ventilated by shafts rising at proper intervals from 50 to 300 feet above the floor.

When it is remembered that each square mile of this section will

yield over *one hundred millions of bushels* of coal, and that Cincinnati, with her 125,000 population, consumes only about six millions of bushels yearly, it will be admitted that Cannelton has a supply of fuel and motive power for a very large population and for centuries.

This abundance of coal will, of course, insure low prices. The only advantage possessed by the company is the convenient and self draining position of its coal strata. An advance of two cents, and perhaps of one cent per bushel would draw an instant and ample supply from the same strata below the water level, from Anderson river, and perhaps from the opposite side of the Ohio.

It is clear, therefore, that the company cannot have a monopoly of this article of prime necessity, and that, even if it had a monopoly, the inexhaustible supply would enable the company, by low prices, to attract population and thus increase the demand for coal and stone and the value of the surface property.

The present rate of "coal leave" is one cent per bushel, and for stone, when taken abroad, 10 cents per perch. For buildings on property purchased of the company no charge has yet been made for stone, clay or timber. For extensive manufacturing establishments the rent of and credit for coal would depend on the circumstances of each case. To the Cannelton Cotton Mill an extensive site and coal rent free for 15 years were given by the company. The general rule has been to offer to the first concern in each department of manufacturing, a bonus, in site and coal, equivalent to the presumed extra cost of starting the business at a new place.

4. THE COST AND MEANS OF OBTAINING AN AMPLE SUPPLY OF FOOD.—The Cannelton markets have been and for some time will be limited in variety, compared with the markets of Cincinnati and Louisville. A full supply, however, is sure to meet the demand. Many acres around the town have this year been put in garden cultivation, and the farmers, for an hundred miles back, are now looking to that market for customers. There will, perhaps, be no other good market for a circle of fifty miles around it. The average prices for a series of years of the chief articles of subsistence will be, say,

Corn.	20 to 30	cents	per	bushel,
Potatoes,	25 " 40	"	"	"
Beef, Pork and Mutton,	3 " 6	"	"	lb.
Butter,	10 " 20	"	"	"
Poultry,	5 " 10	"	"	"
Game,	3 " 6	"	"	"
Eggs,	4 " 12	"	"	doz.
Flour, about	$4 50		"	barrel.

This is an higher average than the prices at the Western markets for the last ten years, and there are many reasons why we may expect them to be reduced.

There are, within 6 miles of Cannelton, and on both sides of the river, at least 12,000 acres of the richest alluvial land, and a cheap and abundant supply of vegetables, milk, and fresh meat may be reckoned upon with certainty.

The supply from abroad may be estimated from the facts stated under the next head.

5. THE FACILITIES OF INTERCOMMUNICATION.—A very slight examination of the physical features of the Mississippi valley and of the statistics of its exchangeable products will show the immensity of the commerce that must exist between the mouth of the Green river and the Falls of the Ohio. Already an average of about 15 steamboats pass every point of this space daily, to and from remote districts. There are lines of packets from cities on the upper Ohio to New Orleans and St. Louis—from Louisville to towns on the Green, Cumberland, Tennessee and Wabash rivers. The slack water improvements of the Green river have connected us with nearly the half of Kentucky; the completion of the Nashville railroad and the improvements on the Cumberland river will give us cheap access to the southeastern seaboard, and the locks at the Falls of the Wabash have opened to us the rich fields of northern Indiana and Illinois. This year many cargoes of wheat, corn, oats and other articles of food from the upper Wabash have passed by Cannelton on their way to the cities and towns on the upper Ohio, and we have arrested some of the pine lumber shipped to Louisville from the foot of Muscle Shoals on the Tennessee. Of the steam packets that constantly take in coal at Cannelton, those from St. Louis are freighted with pig iron, lead, grain, flour, hemp, and hides; those from the lower Mississippi, with cotton, sugar, groceries, fruits and dry goods; from Florence, with cotton, pig iron and lumber; from Nashville, with cotton, pig iron and tobacco; from Little Rock, with cotton and peltries; from Bowling-Green, with tobacco, grain, corn, fruits and vegetables for the Louisville markets: from Terre Haute and Lafayette, Beardstown and Peoria, with provisions and bread-stuffs; while the return freights of these packets are, to a great extent, the products of this cotton, pig iron and food, combined and compressed by the Virginia and Pennsylvania coal.

The natural facilities of access to the country immediately back of this site are considerable. The mouth of Anderson river is the com-

manding point for the counties of Spencer, Perry, Dubois, Daviess and Martin; and the rich counties of Green, Owen, Putnam and Montgomery are nearer this point than to Madison, New Albany or Evansville. The valley of Anderson runs north for about twenty-five miles; at thirty miles is the fertile valley of the Patoka; at thirty five miles is the South Fork of White river; in a north-westerly direction Vincennes is reached at a distance of 50 miles and by an easy route that crosses the White river and the Ohio and Erie canal. The State road to Greencastle will run nearly north. From Orleans, a point on the New Albany and Salem Railroad, Troy is about the same distance as New Albany.

The natural route of the roailroad pointed out in the article on p. 60 from the Am. R. R. Jour., is nearly north, and will intersect the roads from the Wabash running eastwardly.

Thus it is apparent that Cannelton is very favorably situated in respect to an abundant and cheap supply of food, and in facilities of intercommunication.

6. The price of lots in the town and of land in its vicinity.—Prices of lots and of land depend on position. The best lots are now selling at from $5 to $7 the front foot. The prices range from $7 to 50 cents, and the lots are generally from 100 to 121 feet in depth. The company will not sell lots except on condition of improvement within a limited time. Lots in the vicinity, of not over 10 acres are offered for sale on the same conditions as to improvements. The prices will be governed by position and the character of improvements stipulated for. To those who wish places for mills and work-shops, the company is disposed to afford the most eligible sites on the most liberal terms.

Land adjacent to that of the company, is rated at from $40 to $3 per acre; and within 10 miles and back of the town are lands yet unsold by government that can be had at $1 25 per acre.

7. State and local taxes.—The State, County and Road taxes in Indiana average about ¼ per cent on the actual value of property. The public schools are chiefly supported by interest on proceeds of sales of school lands.

The taxes for all purposes are not likely to exceed ¾ of 1 per cent.

8. The means of education, and opportunities of enjoying religious privileges.—The company give two lots for church and parsonage to each religious society, and a lot for every educational and public purpose. It will also erect a commodious school house during

the present year. On page 104 will be found a notice of the present schools and places of public worship.

The company will do all in its power to extend the sphere of usefulness of the teacher and the preacher, who are justly regarded as the ablest auxiliaries of the manufacturer.

9. CHARACTER OF THE WORKS ALREADY IN PROGRESS, THE DEMAND FOR LABOR, AND THE PROBABILITIES OF A RAPID INCREASE OF POPULATION AND APPRECIATION OF PROPERTY.—Twelve months since, the population of Cannelton and its vicinage was about 600, who were wholly supported by operations connected with the mining of about 400,000 bushels of coal yearly for steamboat demand.

The increase of tonnage on the western rivers, according to the report of the Topographical Bureau, is about 16 per cent: the increased demand for coal will exceed this ratio and call for a corresponding and steady increase of population.

There are many who argue that the power of the river current is weak when compared with the power of steam, and that the cities at the Falls of the Ohio must soon be supplied with fuel from these mines. These cities now require about two millions of bushels per annum, and an additional population of from one to two thousand would be required here to supply one half of that demand.

The erection of the first cotton mill and the buildings directly and indirectly connected with it has already added nearly one thousand permanent residents to Cannelton. The operatives of that mill, say 300, are yet to come. These, with their families and dependants, may reasonably be estimated at over another thousand. The Indiana mill, the foundry, and the saw, flour and planing mills, will give a further demand for and support to labor. The grading of a wharf, opening of streets, and other contemplated improvements of the company; the making of a plank road to Troy (already commenced); the manufacture of fire-brick, and the working of stone for foreign demand, give promise of operations capable of almost indefinite expansion: while the great natural advantages here for almost every kind of manufactures authorize the expectation of a rapid and steady increase of population and appreciation of land in the town and its vicinity.

10. THE OPPORTUNITIES OFFERED FOR MAKING ADVANTAGEOUS INVESTMENTS IN AND NEAR CANNELTON.—To men of small means, who wish to occupy the land they own, it is doubted whether better investments can be made than in lots in the town at present prices, or

in small holdings in the vicinity. The company specially desire the prosperity of those who buy and settle on portions of their property. It offers lots and lands at village rates and with but little reference to the extended operations alluded to. If but a tenth or hundredth part of the expectations of the company are realized, they who purchase lots or lands now will be satisfied with their investments; and, should Cannelton increase in population and wealth as accessible coal districts always have increased, such investments will result in immense profit.

At the little towns now being laid off from three to eight miles around Cincinnati, lots sell from 3 to 10 dollars the front foot, while lands (hill sides) believed not to equal ours in quality and position, and at the same distance from that city, sell at about $250 per acre for the cultivation of the grape.

The vinedressers around Cannelton can find good markets for their products and a demand for their surplus female labor in the mills. In the opinion of Mr. Longworth, the climate and soil of this district are peculiarly favorable to this branch of industry.

The lands back of the property of the company and between Anderson river and Deer creek, are rich in minerals which eventually will be in demand, and the sources of great wealth. Mineral lands in England, Belgium and Germany, intrinsically inferior to these, sell for thousands of dollars the acre, and without reference to the surface. Even in the recesses of the Alleghany mountains coal lands, not superior to these, are now valued at immense prices.

Opposite the property of the company, and in Kentucky, both on the river banks and at the sides of the coal hills, are many eligible sites for mills, and "coal leave" can be had there at very low rates; while above and below Hawsville are large bodies of very rich alluvial lands, now held at low prices—very low, when compared with the prices of equivalent land on the upper Ohio.

11. THE BRANCHES OF BUSINESS MOST APPROPRIATE TO THE PLACE, AND WHICH WOULD BE MOST LIKELY TO YIELD THE LARGEST PROFITS.—In the first part of the appendix will be found the statistics and detailed estimates in reference to the great advantages of this position for the manufacture of the lower grades of cotton cloth. The same statistics, in connection with others that are well known, will show the manufacturer of wool and iron what advantages he would find in this district.

The southern and Western border market now calls for immense

supplies of cotton, wool, iron and wood fabrics. Here, then, is evidently a most favorable point to make blankets for the Indians, osnaburgs for the negroes, plows and wagons for the planters, axes and scythes for the farmers, sheetings and shirtings, coarse articles of hardware, cheap furniture, glass and pottery, and the thousand articles of common use in an agricultural country, that will not bear distant transportation; that can be made out of our own materials by the use of our own power, where labor bears a small proportion to the cost of material and transportation, and yet is of more importance than capital.

In the recent trial before the Supreme Court of the United States, in the case of the State of Pennsylvania *vs.* Wheeling Bridge Co., it was proved:

"That, in consequence of the modification of the English navigation laws, and from other causes, the business of ship building has been revived at Pittsburg with great success. Five or six government vessels, cutters, and war-steamers, have been built there within five years and floated with their masts to the ocean. Many sea-going vessels are now being built there, and New York capital has gone there in large amounts for this purpose. That, in consequence of the *greater cheapness of timber, iron, coal and labor, such vessels are built there at 20 per cent less cost than on the seaboard.* That, the timber is suitable for the purpose, and that the great abundance of *bituminous coal* gave that city great advantages for working in iron and other materials suitable for ship building."

At Cannelton the coal is equally abundant, the iron and hemp for cordage are nearer; *the important obstructions to the river navigation are above,* and the timber is equally good and abundant. It is confidently believed that the peculiar advantages of Cannelton for this business in all its departments, will soon be appreciated and fully developed. No good reason can be given why vessels built here should not take the surplus goods (if a surplus should be made here) direct to the Brazilian and India markets.

It is strongly recommended that families should not be taken to Cannelton until proper accommodations have been secured. From one to two hundred tenements have been and will be erected this year besides a Hotel of the largest class; yet nearly all are full or engaged.

The agent of the company will, on application by letter or otherwise, answer all inquiries on this subject, and do all in his power to secure suitable dwellings for emigrants. He will also, if requested, select lots and make contracts for buildings on as low terms as can be had.

The lots of the company have a fixed price, and the tetms of payment, for the present, are one-fifth cash, and the balance in 1, 2, 3 and 4 years, with interest. The improvements stipulated for depend on the position of the lots.

APPENDIX.

RELATIVE COST OF STEAM AND WATER POWER FOR MANUFACTURING PURPOSES.

We call attention to this iustructive and valuable paper, promising to continue the subject hereafter. The author is a practical man, and his views have been fully indorsed in the highest quarters. The question of our ability to compete with the East in the manufacture of cottons, turns very much upon the proposition here discussed. If steam power *here*, is cheaper and better than water power *there*, it must at once be admitted, the chief seat of cotton manufacture will, eventually, be over and near our central coal fields.—*Editor of Com. Review.*

While we discuss this subject, let it be borne in mind, that water power, like all other things which exist in fixed quantities, must ever be circumscribed within the limits prescribed by the Creator. Hence, each quantum of water power, applied to practical purposes, reduces by so much the quant ty to be appropriated. The consequence is, as one mill site is occupied after another, water power is increased in its market value, because, unlike articles which are the production of human art and industrial efforts, the quantity cannot be increased with the increased demand. With steam power, where fuel is abundant, the case is precisely the reverse.

Steam engines, of any given power, may always be had to order, at any designated spot. No matter how rapidly you may multiply them, the supply will equal the demand. The materials for their construction cannot be exhausted, and human art and labor will ever be adequate to our wants. Under these circumstances alone, steam power would not be likely to increase in cost. But there is another very important consideration to be taken into the account. The steam engine undergoes continual improvement. The modifications of its form and structure, have for their objects perfection in action and economy in fuel. Vast strides have already been made in this work of improvement. This perfection is still increasing, and no one can predict, with certainty, how much more will yet be done, nor in how short a space of time, towards perfecting that useful and truly wonderf l invention. All such improvements serve to reduce the cost of steam power, by reducing the quantity of fuel and labor necessary to a given result, while, at the same time,

they increase its productive value, by rendering the steam engine more simple, more durable and efficient, as well as reducing its cost. Thus, all these causes combined very much diminish the cost of steam power, while that of water has increased; and the causes which have produced these results thus far, will still continue to operate. These facts are now beginning to be understood. Hence, steam power is gradually taking the place of water power.

To operate large manufactories, or other extensive works, to advantage, the motive power must be, not only ample, but also infallible; and therefore, it becomes necessary to place them, if to be driven by water power, on streams having a great volume of water, with a rapid current and a great fall. Of such streams there are very few in the West—the best, perhaps, being at Beaver, Pennsylvania, and at the Muscle Shoals, Tennessee. Most of the rivers on the eastern slope of the Alleghanies, are short and comparatively dry in summer. Even in New England, many corporations have found it necessary to purchase lands, and to construct reservoirs on them to contain water, to drive their mills in dry seasons, and which has been done at a heavy expense. The eastern mountains and hills are so steep, that the water passes rapidly from them to the sea; and, in the spring of the year, when the snow melts and the ice breaks up, and heavy rains fall, the force of the flood sweeps before it all ordinary obstructions. To withstand this almost resistless force, dams and locks must be of great strength, and consequently of great cost. The mills are, also, if practicable, placed at a distance from the river banks, and the water conveyed to them through canals. The falls, too, are on rocky formations, and, in general, at the gorges of hills—and which makes excavations, for canals, roads, sites for buildings, &c., &c., very expensive. The operations of mills, situated near the tide water, are frequently suspended by means of the floods or freshets above spoken of. Probably, Lowell is more nearly exempt from this difficulty, than Dover, New Market, Salmon Falls, and many other manufacturing places in New England; yet Mr. Miles, in his History of Lowell, says, eighteen of the twenty-seven cotton mills in the city are situated on the river side, and once or twice each year are obliged to suspend part of their works, sometimes for days together, in consequence of back water. Occasionally, the ice carries the dam away, or breaks the water-wheel. In such cases, the pay of the operatives goes on, or a higher price is, for a time, put on the work. To estimate the loss, per diem, resulting to a company from suspension of its works, I give some of the statistics of the Merrimack mill. This mill has a capital of $2,000,000, and employs 1,737 operatives, at a cost of, say, $240,000 per annum. Interest on the capital, $120,000; making $360,000 per annum, or nearly $1,000 per diem, would be the loss, by the suspension of a single day, aside from the inconvenience. Again, the water-wheels must not be exposed to the frost, but inclosed in masonry—often in excavations in solid rock. Mills, driven by steam, are subject to none of these casualties, nor to the losses and expenses originating in them. Water power may be purchased, in other parts of New England, at a rate, nominally, cheaper than at Lowell;

yet, taking all the local advantages into the account, it is, in reality, as cheap there as at any other place. The present cost of water power, at Lowell, is at the rate of five dollars per spindle. Nearly all the waterfalls in New England, are at considerable distances above the head of navigation; and the estimate is within the truth, when I give the distance from Boston to Lowell (twenty-six miles) as the average distance of the New England factory, from the point where its cotton is landed, and the depot of its goods; both of which are transported, either on railroads or in wagons. From Boston to Lowell, the cost of transportation is $1.25, and $1.10, per ton. But, according to Doggett's Railroad Register, the average cost on cotton and dry goods, between Boston and sixteen of the most important manufacturing towns that receive cotton through that city, and send their goods to it for sale, is $2.75 per ton. This is about the average price of such freight, per steamboat, between Louisville and points three hundred miles distant from that city. If, as will be shown hereafter, a very large portion of this heavy expenditure for land transportation can be avoided, by the use of steam as a motive power, the advantages will become self-evident. The amount of this expenditure is nearly as follows: A cotton mill, of 10,000 spindles, will turn off two and a half tons, per day, of cloth No. 14—say seven hundred and fifty tons per annum. One hundred pounds of cotton, will make eighty-nine of cloth; hence, seven hundred and fifty tons of cloth, will require for its manufacture about eight hundred and forty tons of cotton. This quantity of cloth and cotton, say about sixteen hundred tons in all, will cost, for transportation, $4,320, at $2.75 per ton, to say nothing of drayage, no inconsiderable item of itself. Besides these, is also the transportation of other heavy articles such as oil, starch, iron to replace broken and worn out machinery, coal to heat the mill, &c., &c., all in very considerable quantities and adding much to the cost.

The foregoing are some of the difficulties and drawbacks, though not all, connected with, or growing out of, the use of water power; and we will now proceed to state, on the other hand, some of the advantages derived from the use of steam power. On this subject. we will cite the results of practical operations, of very recent date, and state facts in which there can be no mistake.

The Naumkeag steam cotton mill, at Salem, Massachusetts, is a new establishment, containing about 31,000 spindles. It is the largest cotton mill in America, and the largest in the world in which the entire process of converting cotton into cloth is carried on under one roof. This mill was put into full operation in the month of January, 1847. The following is an abstract from the annual report, made to the President and Directors of the corporation, under date of January 19, 1848:

"In the former annual report, the estimated cost of steam, to drive the machinery and to heat the mill, offices, &c., was $11,420 per annum, including cost of oil, engineer, and firemen. Subsequently, in the actual working of the engine and machinery, experience has afforded satisfactory proof, that the sum stated will be amply sufficient to cover the entire cost. After having run the engine and machinery a suffi-

cient length of time to become certain that there was no mistake in the foregoing statement, it was determined to make an experiment, to ascertain precisely the amount of fuel consumed per day. Accordingly, on Tuesday, (yesterday,) the 18th instant, with all the machinery at work, the trial was made, and the engine and machinery were driven, during all the working hours of the day, at full speed, with four tons and forty pounds of coal. It was deemed hardly possible, were not the fact placed absolutely beyond a doubt, that so large a quantity of machinery could be driven, for so long a time, by an amount of fuel so small. During this experiment, four of the six boilers were used to generate steam for the engine, and the other two to warm the mill, offices, &c. By the latter experiment, it was found, that two and a quarter tons of coal was sufficient to generate steam, to warm the various apartments, and to supply the 'machine shop.' (What is here termed 'machine shop,' is the repair shop, which, during the experiment, was supplied with STEAM POWER, from the two boilers.) Hence, six and a quarter tons of coal will be found sufficient, per day, for all purposes for which steam is required. The four tons and forty pounds is an offset against water power; as the water mill requires to be warmed as well as the steam mill."

The Naumkeag mill has been in constant operation since the above report was made, and has fully corroborated the fact elicited by the experiment alluded to. We deduce from it, and from other data contained in that report, and also, from other sources, the following statements and comparisons:

1st. Something less than 1,220 tons of coal, per annum, is sufficient to drive a mill of 31,000 spindles, on yarn of the fineness of No. 30.

This, at the present price in New England, $5 per ton, will cost - - - - -	$6,100
Wages of engineer (720,) and two firemen (600,) per annum, - - - - - -	1,320
And oil - - - - - -	600
	$8,020 per an.

The water power at Lowell, for 30,000 spindles, would cost, at $5 per spindle, $150,000. Interest on that sum, at six per cent., would be $9,000 per annum—or $980 per annum more than the cost of steam power, to drive the Naumkeag mill. In addition to the cost of the water power is, also, that of foundations for a mill on the river bank. The cost of flumes, raceways, wheel pits, water-wheels, gearing, &c., necessary to the water mill, we offset against the cost of steam engine; the first cost of the former, as well as that of perpetuating them, is greater than of the latter. The actual cost of foundations, however, on the river bank, for a mill of the capacity of the Naumkeag mill, would be, at least, $25,000 more than that for a steam mill, of the same size, on a spot favorable to the purpose. The annual interest, on this difference, would be $1,500, and which makes up a balance of more than $2,500 in favor of steam power. And to this is to be added the cost of trans-

portation, provided the steam mill be located in the immediate vicinity of navigable waters.

We have said a mill of 10,000 spindles would manufacture 750 tons of cloth per annum, and to do it, work up 840 tons of cotton; of course a mill with 30,000 spindles would work up 2,520 tons of cotton, and turn off 2.250 tons of cloth, No. 14. To a mill at Lowell, this cotton must be transported by land *from* Boston, and from the mill the cloth must be returned to Boston. Here, then, is railroad transportation of 4,770 tons per annum, which, at $1,25 per ton, the established rate, produces the sum of $5,962, and which, added to the foregoing items of cost of water, and its incidental expenses, would make an aggregate of some $11,000—and leave a balance of nearly $4,000 in favor of steam power. Besides this, as before stated, the transportation of articles such as oil, starch, iron, &c., is a heavy item—its gross amount would not be less than 200 tons per annum, which, at $1.25 per ton, would cost $250, and of coal for heating the mill, say 400 tons, the quantity used at the Naumkeag mill, would be $500, making in all $750.

Steam power is much better calculated for the manufacture of cotton goods than water power. Steam power is created by art, and as long as the articles of fuel and water are at hand on any desired spot, that power can be perpetuated. Water power, on the contrary, is a natural production, and can be had only where nature has placed it, and then its supply and perpetuity depend altogether on causes over which, as a general rule, human art can exercise little or no control. Water power must be taken as it is, and where it is. Its quantity cannot, by human art be increased, nor can its location be changed. The consequences are, the amount of operations by water power must have its *maximum*, beyond which you cannot go. Steam power is indefinite—perhaps we might say, infinite, in its capacity for extension; and may go on to increase as long as human art and industry shall continue—"as long as wood grows, or water runs." In all cases where water power is to be used, you must go to it with your buildings, machinery, raw material, labor, and whatever else is required, however great the inconvenience may be, and however heavy the expense. On the other hand, if you determine to employ steam power, you can select your spot, where all you require is either at hand, or can be had at the smallest expense; and, having completed your arrangements, you call the steam power, which comes at your bidding, seats itself on a few scores of square feet, which you have allotted to it, and there continues during your pleasure, acting in obedience to your will, and increasing or diminishing as you may desire.

Steam power is much better adapted to the manufacture of cotton goods than water powor, in respect to their quality, and, consequently, to their market value and ready sales. That description of goods is best, and commands the highest prices and most ready sale, which presents the smoothest surface, and the most firm and even texture. That description of cloth is decidedly the best. To produce this superiority, the quality of the raw material being equal to that of others, a certain degree of temperature and humidity of the atmosphere is indispensable

in the manufacturing departments. In addition to this, there is also required a moving power, equable and uniform, and at all times perfectly under control. The temperature of a water mill may be partially regulated by means of a dry heat, so called, from stoves or furnaces; but not the humidity of the atmosphere: this is to be done only by the use of steam. A water mill, it is true, may be furnished with a steam apparatus to produce this effect, but it must be at a heavy additional expense, which would neutralize its benefits; while the steam mill already has the apparatus, which will warm and dry or moisten the atmosphere of the mill at a trifling cost.

Besides this, it is impossible to insure with water power, that equable and uniform motion, so essential to manufacturing purposes, at all times to be had from a good steam engine.

The foregoing statements and remarks. as far as they relate to the cost of steam and water power, are based on the results of actual experience in New England. Taking into account the facilities for steam power, as well as for most other elements of the manufacturing business, connected with a location on the lower Ohio, where that noble stream intersects the great coal field of Illinois, the difference in manufacturing there by steam, will be found immense in its favor, when compared with operations by means of steam or water power in New England. If, under all the circumstances, steam can be applied in New England to advantage over water power, what may not be done at the spot above alluded to.

The article of fuel used in New England to generate steam for cotton mills, and for other manufacturing purposes in general, is that species of anthracite coal of Pennsylvania, termed Lackawana. This coal costs the consumer five dollars per ton, at the port of delivery. The quantity of this coal used at the Naumkeag mill, for all purposes, say, to drive the machinery and to heat the mill and offices, &c., during six months in winter, and driving the machinery during the balance of the year, would be 1,875 tons, allowing four and a half tons per day to drive the mill, and two tons per day in winter to warm it, and for all other purposes. At five dollars per ton, this quantity would cost $9,375.

At Cannelton, on the lower Ohio, a superior article, pronounced by the first chemists in America, fully equal to the best Cannel coal imported from England, can be had in vast abundance, at four cents per bushel. Allowing thirty bushels to the ton, its cost per ton at this rate, would be one dollar and twenty cents. Thus, the same quantity per annum, as above, for the Naumkeag mill, 1,875 tons, would cost but $2,343—and less by $7,031 than it costs for the mill at Salem; and that mill, from the superior character and arrangement of its machinery, equal to any in the world, probably consumes a smaller amount of fuel in comparison with its size than almost any other one in America. Let us now take for further comparison, a mill at Lowell, running 10,000 spindles. The water power would cost $50,000. The interest per annum on that sum would be $3,000.

Eight tons of coal, at Cannelton, nearly one-half the quantity consumed by the Naumkeag mill, with 30,000 spindles would cost but - - - -	$960 00
Engine ($700,) firemen ($300,) and oil ($300,) per annum - - - - - -	1,300 00
Making the aggregate cost of the steam power at Cannelton,	$2,260 00

Actually less, by $740 per annum, than the interest on the first cost of the necessary water power at Lowell. All other things being equal, then the manufacturer at Cannelton, would be assured that he stood at least on an equal footing with him who might command the best water power in America; and no objection against the use of steam power in New England, as to its cost, however good that objection might be there, would have the least bearing or effect on him. But we have other advantages over New England, far more important even than this. Among these is the difference in the cost of transportation.

A mill of 10,000 spindles will work up 850 tons of cotton per annum, and turn off 750 tons of cloth—sheetings, No. 14—averaging $2\frac{3}{4}$ yards to the pound, or something more than 4,000,000 of yards per annum. To transport this cloth from Lowell to Louisville for a market, will cost one-half of a cent per yard. To transport the cotton used in its manufacture, from a southern port to Lowell, will also cost at the rate of one-half a cent per yard of cloth, more than its transportation from the planter to Louisville or Cannelton. Hence, there would be a difference in our favor of one cent per yard in the manufacture of cloth, for a Western or Southern market, and the difference of one half of a cent, even if sent to an Eastern market. The difference of one cent per yard on 4,000,000 yards, would amount to $40,000, which, compared with the manufactory of the East, would be saved per annum. This would be twenty per cent. on a capital of $200,000, to be invested in the business.

The materials required for the erection of buildings exist in great variety and profusion on the very spot alluded to, and labor may be had from 25 to 30 per cent. cheaper than in New England, in consequence of the corrosponding cheapness of almost every article of living. On the very borders of the cotton growing regions, on the very brink of one of the noble rivers which constitute the great thoroughfares of the West, and with the great valley of the Mississippi for a market, the location at Cannelton stands unrivaled, as to its facilities for manufacturing, by any spot in the Union, whether we have reference either to communication, transportation, materials, labor, or the sale of the production of the spindle or the loom, or all of them. These remarks, and the statements which accompany them, are well substantiated facts and practical realities. They require no argument to sustain them, for, to any one at all acquainted with the manufacturing business, and with the circumstances named, or who will take the trouble to inquire, they will become self-evident. But, even in the city of Lowell, itself, a steam cotton mill was erected in 1846, with an engine of 190 horse

power; and that this enterprise proves a profitable one, would seem to be pretty certain, from the fact that another has been commenced in that city, and is soon to be put in operation, with 10,368 spindles, and with 260 looms, with a capacity for about double that quantity of machinery. If, at Lowell, steam power can be made to compete successfully with water power, what may not be expected of steam power on the lower Ohio!*—*Art. IV.—De Bow's Commercial Review, for August*, 1849.

PIT COAL.

If, of the two motive powers, water and steam, the latter is not only more convenient but less expensive, it is important to know where steam can be produced at the least cost.

Were I to state, briefly, that our Western coal fields are more extensive, richer in quality, and far more accessible than any other known; that, on the Ohio, we can obtain coal at four cents per bushel as good as that which sells at sixteen cents per bushel at Manchester, England, I might not be believed. We have heard and read so much of the enormous quantity of coal used in and exported from England, of the wealth it has produced, and of the dense population on and around her coal measures, that we infer that the English coal seams are of greater purity, of vast thickness, and more cheaply worked than in any other country. Text books and Encyclopedias give us very few details of collieries; and the following facts, which I have gathered from books devoted exclusively to the subject, and from topographical works, may be of interest, while they sustain my position.

The only coal measures of practical interest to us are those of France, Belgium, Great Britain, Nova Scotia, and the United States. There are indications of coal in about thirty of the departments of France—that of Aveyron, near Spain, is said to be the most extensive, but, from the character of the country, or some unknown cause, is least worked. The latest authority I can find, gives only 7,000 persons employed in all the departments in the coal mines, and the supply of coals for the French steam marine is obtained from Belgium and England. There is a bed of coal, about 700 feet beneath the surface, extending from Valenciennes, France, under Mons and Namur to Liege, in Belgium. This is one hundred and fifty miles in length, and six miles in width, and about 35,000 colliers are there employed. This quality of the coal is

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*"On all the cotton goods manufactured in New England, the cost of motive power (steam or water) does not average over three mills per yard. The steam mill goods from certain well known causes, are of so much better quality than others, as to texture, smoothness, &c., that they command in market prices so much greater than others, that *the difference will considerably more than pay the entire cost of steam power used in their manufacture.*"—*Hunt's Mer. Mag., March*, 1850. *Art. of C. T. James.*

"The entire motive power required to drive the Cannelton cotton mill of 10,000 spindles, together with the fuel for heating the mill, &c, will not cost as much per spindle, as the fuel required for heating the Massachusetts mill at Lowell.—*Ibid.*

inferior, and its cost and distance from the sea prevent its coming in competition with the English coal.

The coal beds of Ireland and Scotland are, on the whole, inferior to those of England, but have the same general characteristics.

The coal measures of England are west of a straight line drawn from Gosport to the mouth of the river Tees; the most important being on the British channel, in South Wales; in Flintshire, North Wales; in Lancaster and Cumberland on the Irish Sea; Durham and Northumberland on the North Sea; and in Staffordshire and West Riding in central England. The coal in South Wales is only used on the spot for the smelting and manufacture of iron, in the smelting of copper ore brought from Cornwall, and in the manufacture of tin plate. The quantity thus used is about 40,000,000 bushels per annum. The Lancaster and Cumberland mines supply manufacturing cities in these counties, Liverpool and other cities on the channel, and a large quantity required for exportation to France, the West Indies, the Mediterranean, Ireland, and the United States. I may here remark that this coal (known as "Liverpool," "Orell," &c., in the Eastern and New Orleans markets) will continue to be imported by us, at the present duty, as long as it will bring from twenty to twenty-five cents per bushel; but, at this rate, it cannot pay freight. It is used as ballast, and of course the price at which it is sold is no criterion of its cost.

The Durham and Northumberland, known generally as the Newcastle, collieries supply the western and southern sections of England, and the demand in France, Belgium, and the Baltic; the chief market being London. Of the quantity required in that city, some idea can be formed from the consumption of nearly seven millions of bushels in her gasworks.

The coal of central England is used in Birmingham, Stafford, Sheffield, and other manufacturing cities. Edinburgh is supplied with coal from the vicinity; and the extensive cotton manufactories of Glasgow and Paisley are also furnished from collieries in the immediate district.

In stating the *cost* of coal to the manufacturing consumer, and for domestic purposes, this explanation is necessary: It is of kinds and names nnknown to us. Seventy distinct varieties are sent to London, and the screened and the small coal, the slack and the cinder of the same variety are of different prices; often several varieties are combined, and the prices are as numerous as the compounds. Bovey coal is a bituminous wood holding an intermediate place between peat and pit coal; yet it is worked an hundred feet "below the grass." Sulphureous coal is dangerous to work; culm is of but little more value, and neither are used when better coal can be had. The Orell and Cannel varieties are the best for manufacturing purposes, and come nearest, in appearance and velue, to our Western coal. At New Orleans, for manufacturing purposes, the Pittsburg coal is, on the whole, preferred to them; at the Boston gas works, the Indiana coal has been tested with and found superior to them; and in the accurate and numerous experiments made by Prof. W. R. Johnson, under direction of Congress, both Pittsburg and Indiana coal are proved superior to the best Liverpool and Newcastle coal

for the generation of steam. When we shall separate the lamina of our coal seams, we shall probably find all the best varieties for the manufacture of iron known in England.

At Sheffield the prices of household coal) a mixture of hard, small or *sleck*, and round or *cobblings*) is near seven cents per bushel; the strong, clear, and hard kinds, used for iron work, about fourteen cents. The immense consumption of coal in Manchester is supplied from collieries within eight miles, and at the cost of from six cents to fifteen cents. At Birmingham, the price ranges from six to sixteen cents. The Leeds coal is inferior, and sells at about seven cents. At Liverpool the average cost of *small* coal is quoted at ten cents, and of *hard* at thirteen and three-fourths cents. At the Staffordshire potteries the price is occasionally less than six cents; but the coal seam is so soft that only one-third is mined.

The London prices quoted are: "Hetton" and "Walsend" twenty-five and one-tenth cents, and Newcastle, first and second qualities, average twenty-two and a half cents. These high prices, however, are caused by city charges and transportation.

By the term "hard" coal is meant the hard layers of bituminous coal.

I do not find any tabular statements of cost, except in counection with gas works. Here, generally, the best Liverpool, Wigan and Cannel is preferred; and I give the table below, taken from a report of J. Hedley, to the House of Commons, in 1837:

	Price per Ton.	*Price per Bushel.*	*Description.*
Birmingham	11s 10d	$0.108	Bromwich.
Staffordshire	9s 3d	.095	do
Macclesfield	8s	.074	Common.
Stockport	15s	.136	Half Cannel. a 19s 6d
Manchester	15s 2d	.138	Mixed.
Liverpool	18s	.163	Cannel.
Bradford	8s 6d	.077	3 sorts used.
Leeds	8s	.074	⅓ Cannel.
Sheffield	7s 9d	.072	3 sorts used. Cannel a 16s
Liecester	13s 6d	.119	Derbyshire soft coal.
Derby	13s 6d	.119	do
Nottingham	13s 6d	.119	do
London	17s	.154	Newcastle.

$1,447

Which gives an average of over eleven cents per bushel. If we take the average of coal, equal in quality to Pittsburg, the average price at the great manufacturing cities of Birmingham, Manchester, Leeds, and Sheffield, is from fourteen to fifteen cents per bushel. Twenty-six bushels and twenty-four pounds of our coal make a ton. I give twenty-six

and a half bushels to the ton. The respective weights, per cubic feet, are:

Liverpool	78.89
Newcastle	78.54
Pittsburg	78.37
Cannelton, Indiana	79.54

according to Prof. Johnson's report. The advantage of the calculation, therefore, is against us. And yet, in ignorance of the facts, many of our men of capital and enterprise doubt whether we can enter into competition with English manufactures, because of the cheapness of English coal!

THICKNESS AND DEPTH OF THE COAL SEAMS.

South Wales.—The beds have been worked 2,100 feet below the surface, although generally it has not been found necessary to go deeper than 480 feet. There are 12 seams between 3 and 5 feet; 11 from 18 inches to 3 feet, and several, which are not worked, from 12 to 18 inches thick.

Whitehaven.—The Howgill mine is 600 feet below the bed of the sea, and carried 3,000 feet from the shore.

Dunham.—The most important colliery is the Montagu, 3½ miles above Newcastle. Of this the Benwell main is 4 feet 9 inches thick—305 feet deep. The Beaumont seam 3 feet four inches thick—409 feet deep. Low main 2 feet 11 inches thick—523 feet deep. Low low main 2 feet 10 inches thick—882 feet deep.

Of the superincumbent mass 301 feet is Whinstone and post; the first of which is so hard that angular fragments will cut glass, and the latter is a hard kind of freestone, suitable for grindstones.

Cumberland.—"King's pit," near Whitehaven; 1 seam is 12 feet thick—726 feet deep. 2 seams 2 feet thick—900 feet deep. 3 seams 6 feet 1 inch thick—1,293 feet deep.

Ashby.—At a depth of 475 feet, 5 beds of different qualities are worked, averaging about 3 feet in thickness.

Sheffield.—The principal seams worked near Sheffield are: 1. Seam 4 feet thick—depth not stated. 2. Seam 2 feet 3 inches thick, and 78 feet below the 1st. 3 Seam 3 feet 9 inches thick—198 feet below the 1st. 4. Seam 4 feet 6 inches thick—498 feet below the 1st. 5. Seam 5 feet thick—1,098 feet deep. 6. Seam 6 feet thick—depth not stated. Of these, the second seam is largely worked, and known as furnace coal. The third has 7 lamina of different qualities. The fourth is, in working, separated into 8 layers, the lowest portion being Cannel coal, and used exclusively in the Sheffield gas works. The fifth, or "manor seam," has 15 layers, including two of soil. The sixth, or "Sheffield bed," has 6 or 8 varieties, some abounding in iron pyrites.

Northumberland.—The shallowest pit is 138 feet deep, and the lowest 1,230 feet perpendicular; of which the shaft alone cost about $350,000.

At Monkwearmouthshire, the boring commenced in 1826, and had reached, in 1835, as low as 1,590 feet, passing through but a single available seam, at a depth of 1,578 feet; and, indeed, none other was looked for under 1,800 feet deep. In working this shaft about $500,000 had been expended!

"In the 'Alfred' pit, at Jarrow, there is a 30 horse steam engine, erected at a depth of 78 feet below the surface, and used in raising the coals up a shaft which unites with the workings carried out 270 feet deeper still. At this profound depth, another engine draws the coals up an inclined plane that lies coincident with the dip of the strata."

At the "Swan Banks" colliery, near Halifax, the "hard band" coal seam 2 feet 3 inches thick, is 442 feet deep, and the "soft bed" coal 1 foot 5 inches thick, is worked 812 feet below the surface.

The foregoing are about the average value of the coal beds in England. The thickest seam is that called the "Ten Yard-Vein," near Dudley. This, however, as is the case in all very thick beds, is difficult to work. The coal is tender, the roof is not firm, and only about one-third of the coal can be taken out. Besides, thus far, no machinery has been found in detaching blocks of coal from the mass. Where the ordinary pick is insufficient, gunpowder is used, and, wherever this is required, Davy's safety lamp would be superfluous. The seams worked at the least expense are from five to eight feet thick. Of the average depth and thickness of the coal in England, I have no precise data. It is safe, however, to estimate the depth at between 600 and 700 feet, and the thickness from 3 to 3½ feet.

The cost of reaching and working these mines is enormous; cheap labor and capital only could sustain it. Where else but in England would a capitalist persevere for nine years, and expend half a million of dollars without any return, on the judgment of a "coal viewer" or geologist?

The labor and cost of raising the coal from such depths is but slight when compared with that required to drain and ventilate the mines. Drainage is sometimes effected by "adits" or drifts. The Cornish adit, for example, extends its ramifications about 26,000 fathoms, and empties into Falmouth harbor. The adit of the Duke of Bridgewater's mines, at Worsley, is a prodigious work, about thirty miles long, and navigable for barges. But, generally, the water is taken from the mines by the use of the steam engine. For this purpose the "South Hetton" colliery has three engines of 100 horse power each, and one of 300 horse power; of the latter, the beam contains 81,840 pounds of iron, makes fifteen strokes per minute, and raises 800 pounds of water at each stroke. The cost of this engine was £10,000. And yet coal mines are often inundated, and sometimes thereby rendered useless.

The process of ventilating the mines is complicated and costly, and so imperfect that the mines are never entirely safe from the deadly effects of the fire and choke damp. After the awful tragedies at the Pitt mines, it seems strange that man should risk a similar catastrophe, but, in England, life is as cheap as capital or labor.

I cannot, without extending this paper to a great length, enumerate

even all the important obstacles in the way of the English collier, but cannot omit reference to "dykes."

"Dykes," says Mr. Coneybeare, "are an endless source of difficulty and expense to the coal owner, throwing the seams out of their level [at Clackmanshire 1,230 feet] and filling the mines with water and fire damp." And, yet, Prof. Buckland thanks God for so placing these "faults;" "for, without them, ' says he, "the mines could not be drained by the powers of the most approved machinery."

The statesmen of England attribute her great prosperity and power to her coal fields, and Parliaments have anxiously inquired of the surveyor and geologist whether the supply would last two or three thousand years longer. They may, in time, hear of our vast beds of the same mineral, of superior purity, without a "fault;" which is found by drifts and not shafts; which require no artificial means of drainage or ventilation; in whose veins life is safe, and labor not irksome; and which underlies a soil of unsurpassed fertility; and they may remember the fate of Thebes, Athens, and Rome, and reflect that no amount of capital, no preponderance of power can long sustain a city or State when competing with superior *natural* advantages elsewhere.

Nova Scotia.—The Albion mines are in Pictou, on the northern side of Nova Scotia, and eight and a half miles distant from the town of the same name. The coal is transported the whole distance by railroad, or by the river, in barges. The strata are similar to those of Staffordshire. The Sydney and Bridgeport mines are on the eastern side of the island of Cape Breton. The coal in this field is similar in quality to that at Newcastle. Railroads are required here, and also steam "tugs" to tow coal vessels in and out of the harbors. The shallowest pit described is 180 feet deep; as the dip of the veins is rapid and towards the sea, the workings will continually increase in depth. The seams, perhaps, are not as thick as those of England, and, judging from the price at which the coal is sold in New England, the cost of working them is not less.*

Martin, in his "Colonial Library, ' states that all these mines are held by the "General Mining Association" as tenants of the crown and the late Duke of York, with a capital of $2,000,000, chiefly invested in boats, machinery, and other means of carrying on its mining operations. The nearest and only great market for this coal is New England, where its price ranges from 20 to 30 cents per bushel, after paying an import duty of about 45 cents per ton.

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*"The cost of Sydney and Pictou coal on board, independent of interest and royalty, is ninety-one cents per ton. At Pictou the large coal is sold by the single cargo at $3 30 per chaldron"—7½ cents per bushel. Freight of coal from Pictou to Boston (average) $2 9; to Providence $2 39. This gives an average cost of Pictou coal at the wharves of Boston and Providence of *over* 15 cents per bushel, and exclusive of interest, exchange, insurance, commissions, &c. "The Pictou and Providence colliers are able to make no more than four trips during the season of six months, in which the navigation remains practicable and safe." "The relative value of Pictou coal to anthracite is 88-100."—*Coal Trade of Br. Am. by Prof. W. R. Johnson.*

Before I touch on the coal measures of the United States, I make a few quotations from various writers on the importance and value of this mineral.

"It cannot here be necessary to point out the many advantages which we derive from the possession of our coal mines, the sources of greater riches than ever issued from the mines of Peru, or from the diamond grounds at the base of the Neela Mulla mountains. But for our command of fuel, the inventions of Watt and Arkwright would have been of small account; our iron mines must long since have ceased to be worked, and nearly every important branch of manufacture which we now possess must have been rendered impracticable, or, at best, have been conducted upon a comparatively insignificant scale."—*Porter's Porgress of the Nation.*

"The ascent of Mount Blanc from Chamouni is considered, and with justice, as the most toilsome feat that a strong man can execute in two days. The combustion of two pounds of coal would place him on the summit."—*Sir J. F. W Hershel.*

"The amount of the work now done by machinery, moved by steam, n England has been supposed to be equivalent to that of between three and four hundred millions of men by direct labor."

Dr. Thompson says that in the coal fields on the north and northwest of Birmingham, the loss in mining, owing to the tender nature of the substance itself, and the comparatively trifling demand for small coal, amounts to about two-thirds of the entire seam. In allusion to this statement, and the efforts of a celebrated philosopher to economize the application of fuel, Mr. Tredgold exclaims: "The waste, which Count Rumford lamented so much, dwindles to nothing in comparison with the wholesale destruction of a valuable material. Are you a manufacturer? Look around and see what generates the power which enables you to compete with other nations. Are you a philanthropist? Consider that a substance is destroyed which would add comfort to millions of your fellow creatures; consider the risk at which it is procured; the number of lives that are lost by explosions, and the misery these catastrophes create. Surely, some means of rendering that portion useful, which is now wasted, may be devised."

"In a work, lately published by a Spaniard, there is a comparison between the produce of the gold and silver mines in America and the coal mines of England. in which the author exhibits a balance in favor of the latter of no less than 229,500,000 francs annually."

"Pennsylvania realizes from her coal mines an annual income of 4½ millions, and Great Britain of 192 millions of dollars."—*Hitchcock's Geol. Mass.*, 1841.

My last quotation is from the splendid speech of Mr. Webster:

"It [steam] is on the rivers, and the boatman may repose on his oars; it is in the highways, and begins to exert itself along the courses of land conveyances; it is at the bottom of mines, a thousand (he might have said 1,800) feet below the earth's surface; it is in the mill, and in the workshops of the trades. It rows, it pumps, it excavates, it carries, it draws, it lifts, it hammers, it weaves, it spins, it prints,"

The geological map of the United States, compiled from surveys of

D. Dale Owen and others, under direction of Congrees, and from other sources, by Lyell, and published in his travels, gives the boundaries of the following coal fields:

The first near Richmond, Va., of very limited extent.

The second in Massachusetts and Rhode Island, which is not rich enough to compete with the foreign supply.

The third in the centre of Michigan, underlying perhaps one-third of that State and touching Saganaw Bay. Of this I cannot find any further description.

The fourth, or Appalachian, extends from the southern and interior counties of New York nearly to the southern point of the Tennessee river in Alabama. Its western limit is near Pomeroy, on the Ohio river; it approaches to within about forty miles of Lake Erie, near Cleveland, and its point nearest the tide-waters of the Atlantic is perhaps from ninety to one hundred miles west of Philadelphia.

On the eastern slope, in Pennsylvania its character is chiefly anthracite; in Maryland and Virginia bituminous; and here are the richest mines of coal now known. Their value is now fully appreciated.

Anthracite coal was first used on tide-water as fuel in 1820, and the supply sent to market in that year was only 365 tons. In 1846 the total supply was 2,333,594 tons; and 11,468 vessels, exclusive of boats, were loaded with it for coastwise demand. The great and only drawback to the value of this coal-field is its location in the mountains, and its distance from market. Over *fifty millions of dollars* have already been expended in making canals, railroads, and other facilities for transporting the coal to points where it can be profitably used, and then the largest part of its cost is the result of labor outside of the mine. The interest on this capital, and the demand for this labor, will be perpetual.

On the western slope of the Alleghanies this coal-field assumes a bituminious character. The only points, at which it is of present value to us, are where it touches the navigable waters of the Ohio and its tributaries. Here the coal is so abundant, so accessible, so cheaply and easily worked, that geologists and "coal viewers" have not been called on to describe its strata; and the only reliable authority I find in reference to it is in Silliman's Journal, of October, 1835, and taken from a memoir of Dr. S. P. Hildreth. He gives this type of the field in the valley of the Monongahela:

"No less than four deposits of coal are found from the tops of the hills to the bed of the river; the uppermost is at an elevation of 300 feet, and is 6 feet in thickness; the second is 150 feet above the bed of the river, and 7 feet thick—the coal of an excellent quality; the third is 30 feet above the river, 3 feet thick, and coal rather inferior; the fourth bed is a few feet beneath the river, 6 feet thick, and of superior quality."

This coal has some of the peculiarities of the Flintshire, a variety of the Scotch, and one of the Newcastle, but is superior to either.

As this coal-field passes the head waters of the Sandy and Kentucky rivers it takes nearly the characteristics of the pure cannel. On the

banks of the rivers where this coal is mined, its price, aside from the rent, is from 2 to 3½ cents per bushel, and depends on the quantity mined.

It is much to be regretted that our States interested in this field have not had it fully surveyed and described.

There is a coal-field in the valley of the Osage river of surprising depth and richness. This has but recently been discovered, and but little is known of it.

The great Illinois coal-field completes the list. This is nearly of an elliptical form; underlies nearly the whole of Illinois, the southwestern portion of Indiana. and the counties in Kentucky opposite for 70 or 80 miles. It crosses the Mississippi, and then extends 15 or 20 miles on its western bank, about the mouth of Rock river; its edges on the Ohio are at Cannelton on the east, and near the mouths of the Saline and Tradewater rivers, on the west. Its area is not much, if any, inferior to that of all the coal-fields of England. I believe, and think I can show, that on this is to be *the* great manufacturing district of the world.*

In the opinion of geologists, the whole field is what is termed a "basin," and, on the Ohio, is lowest about Henderson. Probably there are only three strata that are worth working. The lower, in geological position, is seen at Cannelton and Trade Water; the upper at Bon Harbor; each of these, at different points, is from 3 to 10 feet in thickness.

On the eastern side the dip is westwardly about fifty feet in a mile; on the western side the dip is eastwardly, but how rapid is not known. Near the Mississippi river the lower strata is said to be very sulphurious.

The positions where it has been worked, and where the coal appears to be of an excellent quality and convenient thickness, are at Cannelton, and on the Wabash and White rivers, in Indiana; about 100 miles up the Green river, at Bon Harbor, and on the Trade Water river, in Kentucky; and on the Saline and Big Muddy rivers, the Illinois river, and the mines of Messrs. Belknap, Ruffner, & Co., six miles west of St. Louis, in Illinois.

ON THE NATURAL ADVANTAGES FOR MANUFACTURING ON THE OHIO RIVER.

The natural elements of a manufacturing district are these:

1. Power—cheap, ample, and certain.
2. Cheap living.
3. Facilities of transporting man and matter.
4. Proximity to the materials to be manufactured.
5. Nearness of the market to be supplied.
6. An healthy position and a climate so equable and temperate that man may sustain continuous labor, even in partial confinement.

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*Since the first publication of this article, the "Statistics of Coal." by R. C. Taylor, Esq.. has issued from the press. The facts collated in that valuable work show, beyond all peradventure, the vast comparative advantages of Cannelton as the site of a manufacturing city.

7. A good site for buildings and near suitable building materials.

Let us examine these in their order.

1. Power.—There is now scarcely any handicraft work, from the simplest to the most complicated, which is not materially aided by machinery. Hands seem to be merely required to set that machinery in motion and to direct its movements. So wonderful are the inventions of this century, that we dare not state the ratio of decrease of human labor in any branch of manufactures. A few years since we supposed that the cotton spindles and looms were perfect, or nearly so; yet, within four or five years, a few simple improvements have been made that have reduced the number of hands in a cotton mill more than one half; and it is now said that much of the cotton machinery in England and New England is scarcely worth having.

The effect of these improvements is to make cheap power more important than cheap labor.

It cannot be necesssary to adduce many reasons why manufacturing should be carried on where the power is found; water power of course is stationary; and, where steam is the motive power, it is generally far cheaper to move the raw material than the coal. For example: 1,000 tons of coal are required in the manufacture of 600 tons of cotton, and from 3 to 5 tons of coal for one ton of iron. Certainly there are exceptions to the rule: it is cheaper to transport coal from Nova Scotia and Pennsylvania to New England than to pay the aggregate freight on the cotton, dry goods, and provisions to and from the bleak coasts of Sidney and Pictou, or the barren hills around Frostburg and Pottsville. Perhaps this exception will be but temporary.

The chief manufacturing towns of England are in the vicinity of coal-fields.* Even the woolen mills of Sussex and Essex have yielded in competition with those of the coal districts.

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*The causes of the growth of modern cities are the concentration, or assemblage in certain localities, of the materials. or the most useful materials, which afford labor for the hand of industry, and from the products of which the growing wants of mankind are supplied

To sustain this position we submit the following concise statements. showing the causes of the growth and progress of the several cities and towns respectively mentioned.

Birmingham. England.—This city, in 1801 had a population of 73,670; in 1831 of 146,986; in 1839 an estimated population of 190,000, and at the present time of probably not less than 250,000. Its opulence, celebrity, and magnitude, are ascribable to the *iron*, *stone*, and *coal*, with which the district abounds.

Bolton, England.—The rapid growth and prosperity of this town dates from 1770–'80. Its population in 1773 was 5,604; in 1801 18,583; in 1811 25,551; in 1821 32,973; in 1831 43,397. It is a seat of cotton manufacture and the birth-place of Arkwright. Its growth is attributed to its command of *coal*, being situated in a coal district.

Bradford, England.—Township consists of 1680 acres; population in 1801 6,393; in 1821 13,064; in 1831 no less than 23,233. and since that period has increased still more rapidly. Its growth is owing to its manufactures which are facilitated by its unlimited command of *coal*, and its abundance of *iron*.

Burnley, England.—Population in 1801 3,305; in 1821 6,378; in 1841 54,192.

When the two are to be combined, the tendency of the bulky is to draw the heavy article to it; and the more valuable the material the better it will bear transportation.

The copper and tin ores of Cornwall are taken to the Welsh coal

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A manufacturing town. Cause of growth: abundance and cheapness of *coal* found in the vicinity, with a good supply of free-stone, slate, &c. The town is built mostly of free-stone.

Bury, England.—A large manufacturing town, consisting of 4,360 acres. Population in 1821 13,480; in 1841 77,496. In the parish of the same name and which include this town are *extensive quarries of building stone*, and *nine wrought coal mines.*

Carlisle, England.—A manufacturing town; supplied with coal from places varying from 12 to 20 miles distant. Population in 1801 10,221; in 1821 15,486; in 1841 36,084.

Charleroy.—An important manufacturing town in Belgium, situated in the centre of the great coal basin of Charleroy. In 1836 it had 72 mines in active operation, producing 900,000 tons of coal per annum. Iron abounds and also quarries of marble and slate. Its furnaces give employment to 3,000 men, and during the winter season 4,000 men are employed in making nails. Its coal, iron, and stone have made it what it is.

Derby, England.—A manufacturing town with both water-power and coal. Population in 1841 35,015; in 1811 it was only 13,043.

Durham, England.—In 1821 this city had a population of 10,282; in 1831 only 10,520. About this time extensive colleries were opened, and population immediately increased, so that in 1840 the number of its inhabitants was put down at 40,000. Previous to this it was one of the dullest cities in the kingdom; *stone, lime, coal,* and *iron* abound.

Huddersfield, England.—The township consists of 3,950 acres, and had a population in 1801 of 7,268; in 1831 of 19,035. The population of the parish in 1840 was estimated at 40,000. It is one of the principal seats of the woolen manufacture, and stands in the midst of a rich coal field. There is also an ample supply of water power.

Johnston, Scotland.—The rise of this town has been more rapid than any other town in Scotland. The ground on which it stands began, for the first time, to be feud, or let, on building leases in 1781, when it contained only ten persons. Its population in 1840 is set down at 7,000. Its growth is owing to the introduction of manufactures, it being situated on a fine water power. It has several founderies and machine shops, and near the town are four collieries.

Leeds, England.—A celebrated manufacturing town, and the great centre of the woolen cloth trade. Population of the *town* in 1831 71,602. Its eminence is owing, partly, to its advantageous situation in a fertile country, intersected with rivers, and partly to its possessing inexhaustible beds of coal.

Leigh, England.—A manufacturing town, with a population, in 1841 of 22,229. In 1834, according to Mr. Baines, upwards of 8,000 persons were employed in spinning and weaving cotton and silk, both by hand and power looms. Its industry and growth is promoted by its abundance of coal and lime.

Lowell, Massachusetts.—Population in 1820 200; at the present time 35,000. Cause of growth, its great water power.

Lawrence, Massachusetts.—Present population 7,500. Four or five years ago it was but a school district. Its water wheels have graded streets, and lined these with splendid edifices on *alluvial* land so poor that it would not average a crop of 15 bushels of corn to the acre without artificial enrichment.

Manchester, New Hampshire.—In 1835 was a small hamlet; in 1840 a few mills had increased its population to about 3,000; it is said to contain now about 17,000 souls. Although it is in a hilly and barren country, and receives its ma-

fields to be smelted; so also have been the copper ores of Cuba and Lake Superior. The coal at Pittsburg has drawn to it the lead of Illinois, and the iron of the Juniata, of Ohio, and Kentucky, and even of Tennessee and Missouri.

The same rules are applicable to the next element—cheap living.

The coal of England attracted our cotton; but, although South Wales was nearer than Lancaster, Manchester became the seat of cotton man-

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terials and sends its products over about 60 miles of railroad it is still growing with rapidity because it has the motive power of the Merimac.

Manchester, England.—The great center of the cotton manufacture in Great Britain, and the principal manufacturing town in the world. Manchester and Salford are separated by the small river Irwell, and form one town, covering 3,000 acres. The population of the town and suburbs, including Salford, in 1801, was 95,313; in 1831 239,388; and in 1841 was estimated at 360,000. Manufacturing has made Manchester. The steam engine, with other improved machines for working up cotton, have made its manufactures, and the coal from the inexhaustible coal field, on the edge of which the city is situated, has fed the engine. Hence the modern growth of Manchester is ascribable to its coal.

Merthyr-Tydvil, S. Wales.—Population 27,460 in 1831; in 1841 34,977. It is remarkable for its iron works, and is wholly indebted for its prosperity to its rich mines of coal, iron-ore, and lime-stone. Towards the middle of the last century it was an insignificant village, and in 1755 the lands and mines for several miles around the village, the seat of the great works now erected, were let for 99 years for £200 a year.

Newcastle-Upon-Tyne.—Population in 1831 53,613; in 1841 estimated at 65,000. It owes its importance, if not its existence, to its convenient situation as a place of shipment for the coal wrought in its neighborhood.

Pittsburg, Pennsylvania.—The population of Pittsburg for each decennary period from 1800 was 1,565; 4,768; 7,248; 12,542; 21,115. With its dependences it has a present population of about 100,000. And although it has lost the greater part of its transportation and commercial business, it is now growing more rapidly than ever. The copper ore of Lake Superior; the lead of Illinois; the wheat of Michigan; the cotton of Tennessee; and even the iron and sand of Missouri are transported to and combined by the power that lies in the Pittsburg coal.

Oldham, England.—A large manufacturing town, chiefly cotton. Population in 1841 42,595. In 1760 it comprised only about 60 thatched tenements. In 1839 it had 200 manufactories, set in motion by a steam power equal to 2,942 horses, and employing 15,391 hands. It has an abundant and immediate supply of excellent coal.

Rochester, New York.—Population in 1820 1,502; in 1830 9,269; in 1840 20,191. It owes its great advantages and rapid growth to its vast water power, created by the falls in the Gennessee river.

Sheffield, England.—Noted for its hardware, cutlery, &c. Population of the parish in 1801 45,755; in 1831 91,692; and in 1841 110,801. Its manufactures are extensive and known the world over. Coal and iron have made the city.

Wolverhampton, England.—This town, or rather the district, including the town, comprises 16,630 acres. Its population in 1831 was 67,514. In 1841 the population of the town alone was 36,189. Wolverhampton, and the places in its vicinity, owe their rapid rise to the mines of coal and iron-stone.

Other illustrations, such as Pottsville, Cumberland, Wheeling, Pomeroy, &c., &c., might be adduced, but those already given are believed to be sufficient to indicate the tendency of men at the present time, to cluster around and to build their homes in such localities as afford them the great staples and materials upon which they may bestow their labor, and for which they may receive the largest rates of compensation.—*Cannelton Economist.*

ufactures, because, besides being in a coal district, it was the centre of a rich agricultural country. The same causes placed Sheffield, Birmingham, and Leeds where they are, instead of on the Tyne, or the Wear. The Staffordshire potteries are over the beds of coal and clay.

While colonies, we were (as Canada is now) compelled, by direct or indirect legislation, to wear English goods; and for half a century after the revolution had emancipated us from this *quasi* necessity, the English artisan was (practically) confined within prison limits; he was not permitted to emigrate, and he could not send plans, models, or machinery abroad.

Slater, the father of the cotton manufacture in America, could not (so closely was he watched at the custom-house) even smuggle over a single drawing or pattern. He had, however, acquired a full knowledge of the Arkwright principle of spinning, and, from recollection and with his own hands, made *three* cards and seventy-two spindles, and put them in motion in the building of a clothier, by the water wheel of an old fulling mill.

Let him who doubts the practicability of manufacturing here look at this humble beginning and take courage. This pioneer, with very slender means and with few friends, surmounted every difficulty, amassed a fortune, and lived to see New England a manufacturing rival of England.

Although we have coal at home and at from one-half to one-sixth of its cost in Lancaster or Massachusetts, the most of our cotton and no small part of our hemp and wool is sent from three to six thousand miles to be manufactured; and then our flour and corn and pork are sent in the same direction to make up the deficiency of food among the manufacturers.

It is not very strange that this state of facts *has* existed, but it will be passing strange if it continue to exist much longer. It will not even require another year of famine abroad to show clearly and *practically* that it is far cheaper to transport the spinner, the weaver, and the machinist to our coal, corn, and cotton, than to pay one freight on the corn and two on the cotton.

The third, fourth, and fifth elements of a manufacturing district are *facilities for moving man and matter, and proximity to the raw material and to the market.* These are resolved into cost of transportation.

General impressions on this point are very erroneous; and, as the result of my statistics may far exceed the belief of those who have not investigated the subject, I give the facts for the full examination of all who feel an interest in them.

In these articles I refer specially to the cost of manufacturing and vending cotton goods because this branch of manufacturing is of more importance and better understood than any other.

Some years since a pamphlet was published in England, by Mr. Graham, on "The Impolicy of the Tax on Cotton Wool." In this is an affidavit of Mr. Gemmell, of Glasgow, who states, "that, although he was for several years in the habit of supplying Chili with cotton do-

mestics, he has latterly been obliged to abandon the trade in consequence of being unable to compete with the manufacturers of the United States."

Chili is a market equi-distant from the two competitors for her trade. What gave New England such an advantage over cheap labor, cheap coal, and cheap capital of England? The difference in the cost of transportation on the raw material.

In 1839–'40, Montgomery* gives this estimate of the cost of importation of cotton to the British manufacturer, the first cost of the cotton being 14 cents per pound.

Charges on shipment	4 per cent.
Freight and insurance	12½ "
Importer's profit	5 "
Inland carriage	1½ "
Duty	4½ "
Total average	27½ "

While the average cost to the New England manufacturer is stated at 11 per cent.

The estimate of the actual charges of manufacturing in the two countries gives an average of six mills per yard against us; yet, taking both charges into the estimate, the net advantage was three per cent. in our favor; and besides this, our goods were the best.

Since 1840, the British Government has been obliged to take off the duty, but it could not lessen the cost of labor, of power, or of capital. The wages of the operative then were barely enough to support life; the cost of coal must increase as the seams nearest the surface are exhausted, and it is doubtful whether the capital then invested in the cotton mill was paying any interest.

The changes that have since occurred on this side of the water have all been in our favor; that is, so far as the cost of manufacturing is concerned. More experience has given us greater skill; we have more system and more economy; new facilities of intercommunication have brought our producers and manufacturers of cotton nearer to each other and lessened the cost of their mutual exchanges; but, more than all, the cost of labor, in which England had so much the advantage, has been lessened over one half; that is, less than one-half is now required. Besides, of late years, the supply of cotton has been so near the demand that the price has fallen from 14 cents per pound to an average of 9 or 8 cents; as the cost is reduced our relative advantage is increased.

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*Mr. James Montgomery. the author of several standard works on the manufacture of cotton in Europe and America. On a subsequent page will be given his opinion of the relative advantages of England, New England, and the Southern and Western sections of the Mississippi valley, for the manufacture of this great staple.

From these facts we have this *corollary:* that, *as the cost of labor, power, and material is reduced, the cost of transportation rises in importance.*

If England cannot profitably compete with us in the Chili market certainly she cannot compete with us here; for the width of the Atlantic gives us a protection, directly or indirectly, of at least 15 per cent. *ad valorem.*

In point of fact, just as fast as the American manufacturer is able to supply the home demand in any article, the English manufacturer is driven from our market, unless, to raise money or to break down a rival, he is prepared to sell at less than cost. It is to be hoped that the wages of labor in this country will never be so low that we can compete with China in embroidered shawls or ivory trinkets; or with France and Germany in tapestry or laces made by hand. In such fabrics the cost of transportation bears but a slight proportion to the cost of labor.

It is clear then that England cannot sell coarse, heavy, and cheap goods in this valley in competition with our own manufacturer. Let us see if New England can.

In 1821, as I am told, the first mill for spinning cotton yarn on an extensive scale was established on the Ohio. Now, who sees in our stores a hank of English or Eastern cotton yarn? The same cause that has produced this result—that is, the cost of transportation—must, in a few years, build up all the mills we need to supply us with "domestics."

To see what the precise inducements are to start such a mill here, I give the following details of the cost of transporting cotton from its point of production to us and to the New England mill, and of the goods from the mill to us. It is clear that the difference in the first and the amount of the last give the sum of our advantages in this item, at least to the extent of our home market.

I base my estimates on a mill of 10,000 spindles for convenience, and because that is near the most economical size. It will be borne in mind that the calculation includes the cost of machinery for preparing the cotton and weaving the goods.

At almost any point on the Ohio river the cost of building is less than in Massachusetts. We have stone, lime, clay, and generally lumber on or near the spot. There the lumber and lime is brought from Maine; but few positions furnish good clay for brick; and granite is not as easily worked as our lime or sandstone. The moment there is a demand for it, machinery can be made here 20 per cent. cheaper than at the East. The cost now would be nearly this:

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The factory building of brick or square stone ruble	$30,000
House for superintendent	3,000
Twelve boarding houses for 225 operatives	10,000
Warehouse and store	2,500
Engine, gearing, and pipes for heating mill, put up	8,000
Machinery, at $12 per spindle	120,000
Here a working capital, sufficiently large to lay in a stock of cotton for five months, is	$46,500
Capital stock	$220,000

This estimate is based on the supposition that the mill is located in a town where there are houses, tools, and workshops for laborers and mechanics, and where the machinery can be built.

At a new place, from ten to twenty per cent. may be added to meet extra cost of transportation, &c. In this case, however, the appreciation of land near the mill, and which can be secured by the mill owners, will far more than meet these extra costs.

It may also be good economy to put up the best buildings, and thus offer greater attractions to operatives. The trimmest built and rigged ship will always command the best sailors.

The longer the materiel and its product are *in transitu*, or, in other words, the further the manufactory is from the raw material and the market, the larger must be the working capital; and the interest on the difference is fairly a part of the cost of transportation. And besides, as England and New England are obliged to enter the cotton market once a year, and at the same time, and at the very time when our other great staples are ready for shipment, prices and freights are then generally at their highest rates; sometimes, as we have seen, sufficient means of transportation cannot be had at all; to guard against this contingency, as well as the fluctuations of price, many mills keep a heavy surplus stock.—We can command the market at all times; we are always ready to contract, and can select our own time to receive the cotton. We are here, also, at the point of consumption, we cannot for years supply the home demand, and our goods will be taken as fast as they are made.

With these facts in view, it is very safe to say that the New England mill requires a working capital of $100,000 more than ours; but, to be altogether within the mark, put it at $50,000; the interest on this is the first item of saving or advantage to be carried out—say per annum $3,000. As we can turn over our capital more than once a year, and its earnings at each time will exceed six per cent., we might, with propriety, make the item much larger.

At Lowell there are forty-five mills, containing 253,456 spindles, and with a capital of $11,490,000, or over $450,000 for every 10,000 spindles. If $50,000 is deducted for capital required to purchase the power, $50,000 more to cover the difference in communicating the power and the additional cost of buildings, the working capital would seem to be $130,000 over that required here by my estimate. But I am not

advised as to how much of this capital is required to enable the mill to sell on credit, or whether the surplus fund, usually laid aside out of profits, is sufficient for this purpose. The Lowell corporations rarely publish the amount of their reserved funds, or even of their profits, unless these profits are remarkably low.

The mill in question will turn out, on the average, two tons of goods a day—say six hundred tons per annum. The English estimate of waste and loss is one-sixth; our rule gives eighty-nine pounds of goods for one hundred pounds of cotton; by this the mill will require six hundred and sixty six tons of cotton per annum.

The following estimate of the cost of bringing dry goods to Louisville from Boston, *via* New Orleans, is below the average rates.

Boston wharfage, per bale	02½
Freight to New Orleans, per bale	45
Charges at New Orleans, per bale	30
Insurance, 2 per cent. on $66, or on cost and 10 per cent. added	1 32
Interest *in transitu* 40 days	40
Exchange ½ per cent	30
Freight to Louisville	63½
	$3 42
Add average cost on the bale from the mill to and at Boston, at least	40
	$3 82

The bale, 4-8 brown cotton, of 750 yards, average cost $60; three yards to the pound. This gives over ½ cent to the yard, 1½ cents to the pound, and $30 per ton.

There are, however, but few houses that ship by New Orleans, and at times when freights are low; altogether the largest portion of brown cottons and prints brought to the central West come from the Eastern agent or jobber, and by the lakes or across the mountains.

This is the *ordinary* course of trade, and there is no reason why we should not base our estimates on what is usually done, if the same system is likely to continue.

By these last routes, as every dry goods merchant (wholesale) can satisfy himself by reference to his books, the average freights from the Eastern cities is from two-thirds to three-fourths of one cent per yard. If to this is added the coastwise freight, insurance, interest, profit of the jobber or commission of the second agent, the cost will swell up to, at least one cent per yard, three cents per pound, or sixty dollars per ton.

But, as I have often been told, the agent at Baltimore will sell domestics just as low as they can be had at Boston or Lowell, and the Philadelphia jobber will often sell lower to draw in customers, as he relies for his profits on other goods. All very true; but a moment's reflection will satisfy any man of the fallacy of this reasoning. The manufacturer may wish to get rid of his surplus, and find it his interest

to pay the transportation to, and the commission of an agent in a remote market, but this does not lessen the actual cost of the transportation or agency. The jobber may entice a customer into his store by selling silver at fifty cents an ounce, but this does not prove that the ounce of silver is actually worth less than a dollar. The same kind of argument is often applied to cost of transportation on our river. The Peytona will ask five dollars from a passenger to Louisville who calls her in at Brandenburg, and the price would be the same if he got in at Cairo; yet the writer on the Western carrying trade would be laughed at were he to state that the cost of transportation from Cairo and Brandenburg to Louisville was the same. Coal often sells for a less price at St. Petersburg than at Newcastle; yet no one has attempted to show that the shipment of coal a thousand miles lessens its cost, or that St. Petersburg is the proper site of manufactures, because coal was sold there at a particular day cheaper than at the English coal mines. The balance sheet of every business must show the profits or losses in each of its branches.—The high prices demanded by the larger boats for way passengers and freight have introduced the river packets, and the extra costs paid by the Eastern manufacturer are now building up the Western mills.

To return to the figures; the mill given will consume 666 tons of cotton per annum.

Freight from the cotton districts of Nashville, Florence, Tuscumbia, and points on the Mississippi river in Tennessee and Arkansas, and on the Arkansas river, are about the same to Louisville as to New Orleans. As the river packets multiply, the rates in this direction will probably be lower. Besides, as our agricultural exports increase, the return boats will run light and charge less. Our mill, then, will save the charges on the cotton at New Orleans and the cost between that city and the New England mill, say:

Drayage, storage, brokerage, and commission of agent or merchant at New Orleans per bale of 450 lbs	$1 00
Insurance on $36, or 8 cents per lb	50
Freight, ¾ cent per lb	3 38
Interest, 45 days	27
	$5 15
Or, 1 14-100 cent per pound, or per ton	$22 00
Add charges in Boston	10
Average freight to the mill	2 70
Total per ton	$25 80

666 tons* required at $25 80 gives.....$17,182 80
Add saving in interest of capital per annum..... 3,000 00
Add minimum freight on goods, or $30 per ton on 600 tons,.....$18,000 00

Minimum advantage $38,182 80

But if we add the ordinary freight on the goods, or $60 per ton, we have the *maximum* advantage of $56,182 80, or an average of $47,182 80 on a capital of $220,000, or near 21½ per cent. per annum.—I might add from 1 to 2 per cent. loss on Exchange, as the agents of the largest mills usually sell Bills at 60 days, and at a discount of from 2 to 3 per cent. to pay for the cotton they purchase at New Orleans.

Besides, a large amount of cotton manufactured at the East pays a second profit and the costs of a second transportation.

As I have not access to the Exchange accounts of the Kentucky Banks, (whose agents invest largely in these Bills) or to the Books of the New York cotton speculator, or of the Sound steamboats, I cannot make an average of these items of cost, and omit them in the foregoing calculation.†

I say nothing here of the great saving in fuel and in food; to these points and to giving an aggregate of advantages I propose to devote another paper.

I believe the foregoing estimates are within the truth, and that I have not been able to get at all the items of cost; indeed, many of these are of such a character that they cannot well be specified; such, for instance, as the expenses and time of the merchant who goes abroad to make his purchases; occasional loss and delays in receiving goods for which insurance offices and transportation lines cannot be made liable; and all the contingencies to which a trade between distant points is subject.‡

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* The improved machinery will turn out a large per cent. over this estimate: say 840 tons for a mill of this size and making No. 14 cloth.

† The Connecticut and Rhode Island manufacturers are, to a large extent, supplied with cotton from New York. The New York commission merchant, on the average computes the freight-charges, from New Orleans, and his 2½ commissions at 1¼ cent per pound; say per bale $5 00.

The Providence dealer pays half brokerage at home and half at New York, or 12½ cents per bale. Freight to Providence 25 cents per bale. Cartage at New York 8 cents, and at Providence 8 cents—16 cents per bale. He sells on six months credit, and at an advance on New York price of 1 cent per pound, or per bale of 400 lbs.....$4 00

Deduct 12½ plus 16 plus 25 and you have $0 53½
3 per cent. interest on say $36,..... 1 08
1 61½

Giving him a profit per bale, of.....$2 38½

The Providence manufacturer, then, pays about 2 cents per pound more than the manufacturer of Cannelton or say 25 per cent. on the average price of cotton.

‡ Mr. James Montgomery, whose estimates have already been alluded to, and who is very high authority in whatever pertains to the theory and practice of

The sixth element of a manufacturing district is *a healthy position, and a climate so equable and temperate that man may sustain continuous exertion even in partial confinement.*

Such is and ever will be the competition in manufacturing that the mere operative can expect only a slight advance in wages over the agriculturist.

The latter is usually the owner of the soil he tills; he bears exposure willingly for the increased value of his farm obtained by that exposure. He drains the morass, despite of its noxious effluvia, with the prospect of rich harvests on the same site; but the former stipulates for and only receives a stated pay, and with no expectation of an advance; to be sure, the "factory girl" works by the piece, but she knows, before entering the mill, how many pieces she can turn out. Besides, when the ploughman is sick, his place can readily be supplied; but the sickness of the engineer may stop the work of hundreds, and a large capital may lie idle while a substitute is sought for.

I refer specially to large manufacturing establishments, carried on by associated capital, and under the organization of directors, superintendents, and overseers, of whom the active managers are men of character, and generally men of family, who prefer a liberal and certain income, to the uncertainties of trade or of the learned professions—men who would not, for a limited salary, risk the climate of Singapore or Spitsbergen.

Indeed, the reasons are too obvious for enumeration, why such labor can only be obtained and rendered productive in the temperate zone, and there never was and never will be a manufacturing town at any other than a perfectly healthy position—not even in those countries where labor is constantly pressing for employment. Even after a place (Louisville for example) has become healthy, it requires years to remove unfavorable prejudices.

On this river, at least as far down as the lowlands at the confluence of its western tributaries, there are as few permament causes of disease as exist in any other part of the world; the causes of malaria will soon

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manufacturing cotton, has recently made a personal examination of the manufacturing facilities of the South and West, and thus expresses his opinions:

"I have read General James's pamphlet and the pamphlets written by Mr. Gregg, on the comparative advantages of the South for manufacturing, and yet, after all I have read on the subject, I may say, with the Queen of Sheba, *half the truth has not yet been told.* Cheap living, and, of course, low wages, cheap cotton, coals, and iron, constitute the great elements of success in the introduction and prosecution of the cotton manufacture. *No country in the world possesses these elements in a degree equal to the southern and southwestern sections of the United States.* Great Britain, with her cheap coals and iron, stands at the head of all nations in point of wealth and commerce. She is now making a desperate effort to introduce cheap living, but she can never introduce cheap cotton. The Northern States can never equal the South in either of the above named elements. I hope your Cannelton mill is to be a model for all the South. *It is only in manufacturing towns and cities, where there is a concentration of skill and talent, that we look for the highest degree of perfection in the mechanical and manufacturing arts. Such cities always exert the greatest influence on the country generally.*"

be entirely removed by the cultivation of its banks, and the constant agitation of its surface by boats; and, in a few years, bilious fevers will be as rare here as at the East, while we are comparatively exempt from that scourge of the Northeastern seaboard, the consumption. There, as experience has shown, the piercing winds, coming unobstructed from the icebergs of the Arctic ocean, bring death to those coming out of the heated rooms of a city or manufactory; but the cold air of the lakes and the mountains is tempered before it reaches us.

Our coal districts are proverbially healthy. Coal smoke is by many believed to be one of the best disinfecting agents, and the usual epidemics of the country have become less fatal when the use of coal has become common; perhaps this is one of the causes why the centers of our cities are always regarded as more healthy than the suburbs.

The eighth element is *a convenient site, and near suitable building materials.*

It would astonish one who has never thought of the subject to calculate the amount of fixed capital expended in grading an uneven site of a city, and in its buildings. The filling up of our ponds and cutting down of our sandhills has been but a mere trifle when compared with simlar expenditure in other cities.

The splendid Quincy market house in Boston, and the immense blocks of granite warehouses around it, now stand where ships once anchored; millions of dollars have been paid by New York for the timber and lime of Maine, the granite of Massachusetts, the sandstone of Connecticut and New Jersey—and she has even been obliged to send to New Hampshire and Maryland for brick.

The very cost of transportation on the building materials, already sent to New Orleans from New England and the Ohio river, would, at many points on this river, build a large manufacturing town, and furnish it with a working capital.

At our coal fields on the Ohio are the best of building materials—common clay, fire clay, fire stone, and limestone are on the spot or in the immediate vicinity; while, underlying the coal, is a stratum of sandstone, with a single stratification which splits readily, is soft in the quarry and hardens on exposure to the atmosphere. This is now being taken for the construction of the public works at Memphis, and is pronounced equal in durability to the same character of stone used in the construction of Trinity church, New York, while it is cut more readily.

Here, then, on the banks of the Ohio and its tributaries, and especially at Cannelton, we have *all* the *natural* elements of a manufacturing district: cheap fuel, cheap living, cheap land, cheap stone, clay and timber, cheap raw materials, cheap transportation, in a healthy country, in the centre of a great market; and, besides, we have good laws and light taxes.

Where else, in the wide world, are all these advantages found in combination?

The *artificial* elements of a manufacturing district are *capital;*
Labor and skill in all the departments depending on each other;
Reputation, or, as it is sometimes termed—good will;—and *a condi*

tion of society and code of laws adapted to the permanent employment of labor and capital in manufacturing.

First of *Capital.* There are three distinct epochs in the history of manufacturers—

The *first* is typified by the Arab of the desert with his warp stretched from pegs stuck in the sand, and by the early emigrant at her wheel or loom. The manufacturer here has grown the material and will wear the product.

The *second* is where one or more unite capital and skill, under some form or other of copartnership, to manufacture what others have grown and others will consume.

In the West we have reached this stage, which, in this country at least, will not admit of great extension; because partners often disagree, and at the dissolution of the partnership by death or otherwise, the concern has to be re-organized; and because the father is rarely sure that his son will have similar taste or skill to employ capital advantageously in the mill.

In Europe, society is much divided into castes, and the son is trained up to follow the calling of his father. In France we see the same brand on the wine cask that was noted a century ago; so in England the sign of a shop often occupies its place without change through several generations. In such a state of society, joint or family interests may be sufficiently strong to give permanency and profit to a manufactory requiring a large outlay of fixed capital.

This system was tried at the East and was soon abandoned as unsuitable to our people and institutions, and as soon as it was evident that the business of spinning and weaving cotton could be made permanent and profitable, the shrewd and calculating New Englanders passed to the *third,* or golden age, in manufacturing; and it is to the well-considered system of Lowell and his associates, and the working plans drafted by them, that New England is now indebted for her eminent success and the largest part of her present wealth and importance.

That system is,

The association of capital, protected by liberal charters, and under the management of Superintendents of high character, Overseers carefully selected, and Directors in whom the public have entire confidence.

This system, which has worked so well elsewhere, is worthy of our adoption; wherever it has been tried the results have been the same; it has stood the test of a quarter of a century and it does not require the gift of prophecy to predict the same result here.

It is admirably adapted to our institutions and the character of our people.

It is the *democratic* system,—for by it the hundred dollars of the poor man, invested in the stock of the corporation, draws as large a dividend as the hundred dollars of the rich man: it is the system *safe* for the public,—for it requires at the outset a capital sufficient for its purposes and asks no credit; and safe for the stockholder, as he only risks his stock and cannot well be ruined by the mismanagement or knavery of

associates; this is the system which gives surety to the operative for his wages, and to the agriculturalist for the price of the food furnished by him to the operative; and the results of its adoption here will be seen in lessening the cost of fabrics our necessities require,—in increasing the amount of our productive capital,—in enlarging the number of profitable employments of our young men of capital and enterprise, and in giving us an important home market for our raw materials and provisions.

The way in which this system works, and *why* it works well will be seen hereafter; but under it, as perhaps every reflecting man will admit, the West has already abundance of capital for the purpose. It is not expected that our very rich men will leave their comfortable homes for new positions where there are peculiar natural advantages and where manufacturing can be made most profitable; or that they will personally superintend the details of making cotton or any other fabrics; nor can it be expected that they will risk the earnings of years to the management of a distant co-partner or agent.

To manufacture cotton, or indeed any other great staple, at the most profit we must do a large business; the cotton mill of 10,000 spindles will make goods probably ten per cent cheaper than one of 1,000 spindles; the first requires a capital of, say $300,000; now it would be preposterous to make the attempt to get a Lexington capitalist to furnish that large sum of money to any man or for any purpose, however great the "paper profits" might appear, or however strong might be the faith of the capitalist in the general profits in the business proposed: it would be equally preposterous to ask three hundred men to contribute $1,000 each, and also their individual skill and labor, to any copartnership concern. But, if you start twenty mills under the guardianship of the same men who so satisfactorily manage our Bank and Insurance capital and under the direct superintendence of a man of unquestionable capacity and integrity, and with the checks of Treasurer, Overseers, &c., where there is no liability beyond the capital invested, and where the stock promises large dividends, you will find the rich man taking his risks in each mill; while the man of less capital will follow the example to the extent of his means. They who construct the buildings or furnish the materials and machinery, and they who wish to sell the goods or obtain employment in or about the mill will be glad to take all the stock they can afford to hold. Labor and materials to a considerable extent will be equal to money.

It is said that steamboat capital does not, on the average, pay 6 per cent per annum—yet how easy is it, on any point of our river, to start a boat costing from thirty to fifty thousand dollars—in this the shares are rarely over 1-16—but in a cotton mill each share would be, say 1-3000. The boat owners are the builders of the hull and the engine, the officers and the commission merchant; would it not be far easier to raise the capital of the mill and partially in the same way, with anticipated profits of 20 to 40 per cent, and in a business attended with less risk and giving constant employment, and at the same place? Let those who scorn small contributions to great works remember that most glorious of

all monuments, the Polish mound, made by a grateful people, of whom each contributed but a spadeful of earth—or the more recent instance of the subscription of half a million of dollars by Irish laborers, which ensured the completion of the western rail-road from Boston to Albany.

It is believed by many that there has been an increase of specie capital in the Mississippi valley since 1836 of nearly one hundred million of dollars, and that its annual increase is from ten to fifteen millions. It is said by those who have the best means of knowing the facts that something like five millions of specie are annually brought into the West by European emigrants. Some shrewd calculators make the exports of Indiana and Illinois over their imports from six to seven millions of dollars per annum. It will be remembered that the Government does not now drain us of specie through its land offices, and that we are now nearly freed from Eastern land speculators. Our independence is shown in the strength of our banks and the favorable state of our domestic and foreign exchanges. In the interior, the rate of interest has fallen to 6, and in some sections to 5, per cent per annum; while in our cities and large towns our banks furnish all the facilities desired for legitimate business transactions.

We have so long been dependent on the East for money capital that it is difficult for us to look for it in any other direction. We have now sufficient strength to stand erect, but have scarcely learned the use of our feet.

But, perhaps, we are to look to the South for capital, either in money or its equivalent cotton. The cotton planter for years has been chagrined that he has made less in producing than the New Englander has in manufacturing the cotton; and he will gladly avail himself of the opportunity, now perhaps first presented to him in a practical shape, of making the manufacturers' profit. He could not manufacture in Glasgow or Manchester; and Lowell was too far distant for him to invest in her mills. At home he has not the labor, power, conveniences or skill. The lower Ohio is within his reach. (I refer to the planters on the Mississippi and its tributaries.) Here he can, while overlooking the management of the mill, mingle business with pleasure during the summer. Many may smile at the idea of getting surplus capital from a cotton planter, and may exclaim, mortgages, execution, advances, &c., yet let me assure such that the southwest is in quite a different condition now from what it was ten years since. Let them remember that not only has the cotton crop vastly increased in that period, but that the facilities for obtaining credits in New Orleans have been greatly diminished, while at home there are now comparatively no such facilities. Many of the planters now consign their crop to Louisville, Cincinnati, Pittsburgh, the Eastern cities and even to Liverpool, and neither ask nor wish for an advance. Let it also be remembered that the cotton planter has nothing at home to invest his surplus in, save more land and slaves. He has no canals or railroads, houses, or ships to build; he has no banks to deposit his money in even; he does not wish to take mercantile risks or to leave his money long in the hands of those who do take such risks; would he not gladly invest in mills near him, where his

own cotton would be spun and woven, and on its way to market and on his way to the springs or his summer residence? Indeed he might find a healthy summer residence within sight of the mill. He would realize the value of his cotton (indeed trebled in value) from the goods before he could get his returns from that consigned to the Liverpool factor.

This direct consignment is, of course, the most favorable for the planter. When the New Orleans or New York speculator buys the cotton and consigns it, the planter, of course pays, or rather loses, the intermediate profits.

On this reliance on the South I have not only to state its reasonableness, but the positive assurances of very many planters who have surplus capital, that they and their friends are ready to take stock in cotton mills just as soon as they, who practically understand the details of putting up and managing mills, will obtain the charters and superiniendants and contractors.

But we cannot expect cotton mills to leap into existence at once. Several years will be required to erect buildings, obtain machinery, &c. Then the first that are started will make profits to build others; besides, the moment we show the East that we have systematically and energetically undertaken to manufacture our cotton and hemp and to eat our corn and pork at home, the building of new mills there will be checked, and the men of capital and enterprise there, who wish to engage in the business, will bring their capital, skill, and labor here.

It will be seen under the next head what of these requisites we may expect from abroad.

LABOR AND SKILL.

The first, and, as is supposed, the strongest objection made to the present commencement of manufactories in the West, is the scarcity and high price of labor.

In view of the millions of acres we have untilled, labor is indeed scarce—but in view of the prices obtained for our agricultural surplus products, labor is abundant.

The *money price* of mechanical labor is now actually less in the settled and healthy sections of the West than in New England; the average of wages in all employments and positions is certainly not more than 10 per cent. higher. The day laborer in Boston gets $1—here 75 cents—farm hands here, $8 to $16 per month: there $15 to $25. But this money, thus paid, is the measure of *two values*—first, of wages; and second, of what it purchases for the laborer. In this view labor is cheaper here than in any country where the bread fruit and plantain do not grow. He who labors for pay looks at the result of receipts and expenditures of the year, or of life. He can live here equally well at one third less than in New England and at one half of what he could in England. He can therefore work here from 33 to 50 per cent. less than in the two great manufacturing countries of the world. If we give the same wages, the laborer can lay up from 33 to 50 per cent.

more here than in those countries, and if he buys land with his earnings. he gets ten, or fifty, or one hundred times as many acres here as he could get there.

All this, says the objector, is very plain, but we have not enough artisans here for the new employment, and if you call them from abroad, will they come? The answer is in the fact that whenever and wherever we have furnished profitable and certain employment in the West, the call for labor has been promptly supplied. The operatives in cotton mills have not come, because we have built no mills for them—capital has not come from New England for investment in cotton mills, because it has yielded so large an interest at home; and it has not come from England, because of the distance and the absence of direct communication between the two points and the ignorance on the part of the English manufacturer of our advantages.

We are to look first for superintendents and overseers among our best men. As we can afford to pay very high prices, it is not doubted that the men can be had, and we cannot admit that the Anglo-Saxon here has not as much enterprise and intellect as in the East or in England. The salary of a superintendent of a Lowell corporation ranges from $2,000 to $6,000 per annum, and this commands the highest grade of talent in New England. It takes the lawyer from his practice and the judge from the bench. The average salaries of the Governors of the New England States is $1,208 per annum, and of Judges of the Supreme Courts is $1,415 per annum. $2,000 here is equal to $3,000 there. Will not this price command the same talent here? If not, we have the surplus fund of savings in transportation so to increase the amount until we can draw the Lowell superintendent from the Lowell mill.

For ordinary operatives we have three sources of supply:

First—*domestic.* In the opinion of some fifty manufacturers of whom I have sought information, there will not be the slightest difficulty in obtaining male operatives at home, and at as low a rate of wages as that paid in New England, and as little difficulty in obtaining females, if the proper system is adopted. One of the oldest and most successful manufacturers in the interior of Kentucky says that he has no difficulty in obtaining any number desired for his cotton mill, and could increase this number to a great extent. At Cincinnati the supply is greater than the demand, and at the largest cotton mill there, applications for employment are only received on Monday morning. In Louisville, our clothing merchants, printers, bookbinders, paper makers, &c. hire as cheaply as in Boston; and those who have the best means of forming an opinion on the subject, and without an exception, say that the supply of such labor will be greater than the demand.

It may be necessary to state to those who have never seen or read the details of a cotton mill, that it does not require as long an apprenticeship at the spindle or power loom as in most employments; from thirty to sixty days is long enough to give both theory and practice. The average period of residence of the female operatives at the New England manufacturing towns is only about four years, yet there is more

and better work actually done in the same time by these operatives than is obtained from any operatives in the same employment in the world.

The next source of supply is from the East, and particularly from New England.

Twenty years ago I came from the center of the cotton manufacturing district of New England, and since have had every means of knowing the feelings of every class of persons there engaged in manufacturing; and I say with knowledge and with confidence that, were I to go there now and advertise in the newspapers, or even put placards on the guide posts at the road crossings, that I was authorized by responsible corporations, who had made and would conduct cotton mills on the Lowell system, to contract for the immediate employment of male and female operatives for those mills, and at the same wages paid at Lowell, and that the place of employment was at an healthy position on the *free* bank of La Belle Rivière, for every hundred desired there would be a thousand applications.

The father would come because he could exchange his few paternal acres for broad fields in the West; the son would come to a country offering greater freedom of action and a wider scope to his ambitious plans; and the daughter would come from the novelty of change, and because, of the female sex in New England—the supply is greater than the demand.

The next source of supply is from Europe, and particularly from the manufacturing districts of England. To show that I do not merely rely on conjecture and general reasoning, I bring the facts from the best English authority known.

In 1840, a select committee, of which Mr. Hume was chairman, was raised in the House of Commons, to take into consideration the general condition of the manufacturing interests of Great Britain and the policy of modifying its system of import duties. A mass of testimony was given to this committee by the officers of the most important boards of trade, and chambers of commerce, and by the leading manufacturers. Although neither the committee nor the witnesses stated, in direct terms, that the manufacturing prosperity of England was on the wane, and that she could not, besides paying the cost of transportation, compete with the cheap food and natural advantages of many other countries (the United States for instance) which had been her best customers; it is quite apparent that such were their impressions, and that they were only deterred from stating the truth boldly by the fear of giving encouragement to competition abroad. Let the reader judge from the following extracts.

"Your committee gather from the evidence that has been laid before them, that while the prosperity of our own manufactures is not to be traced to benefits derived from the exclusion of foreign rival manufactures, so neither is the competition of continental manufactures to be traced to a protective system. They are told that the most vigorous and successful of the manufactures on the continent have grown, not out of peculiar favor shown to them by legislation, *but from those natural and spontaneous advantages which are associated with labor and capital in certain localities, and which cannot be transferred elsewhere at the mandate of the legislature, or at the will of the manufacturer.* Your commit-

tee see reason to believe, that the most prosperous fabrics are those which flourish without the aid of special favors."

That is, when these fabrics are made where the "natural and spontaneous advantages" exist; where (as in this valley) God has given all the "special favors" that the manufacturer needs.

"With reference to the influence of the protective system upon wages, and on the condition of the laborer, your committee have to observe that, as the pressure of foreign competition is heaviest on those articles in the production of which the rate of wages is lowest, so it is obvious, in a country exporting as much as England does, that other advantages may more than compensate for an *apparent* advantage in the money price of labor. The countries in which the rate of wages is lowest, are not always those which manufacture most successfully."

For illustration: When cotton is at 8 cents per lb. in New Orleans, the difference between its cost to the Louisville and the Manchaster manufacturer, for a mill of 10,000 spindles, would be about $25,960 per annum. At our rate of wages about $25,600 would be paid yearly for labor in the mill. We therefore can pay the laborer double price, and be on an equality, if we had no other advantage.

Impost duties were higher in England than in France, yet the Spitalfields' weaver had to yield to the weaver of Lyons, because food was cheaper at Lyons than at Spitalfields.*

Egypt grows cotton, and the Pacha of Egypt undertook to manufacture it largely; he selected the best cotton and paid his own price for it; he imported the best machinery and the most skillful managers; he gathered the strongest and most active of his Fellahs and Arabs, and brought down

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*It would seem that no country can largely manufacture for export when it has to import food

The full and short time of the Lancaster cotton mills is measured on a sliding scale that has almost precisely corresponded with that at the Liverpool custom house.

The Middlesex (Massachusetts) mills are now closing, *chiefly* because the supply of food in Massachusetts is far less than the demand. The operative is ready to remove from positions where beef is 15 cents per pound, to where it can be had at 5 cents per pound.

The chief material that is combined in cotton cloth, bar iron, &c., &c., is food. The *locus in quo* of the manufacturer is where, other things being equal, the materials required in and about the fabric can be brought together at the least cost.

The truth of this proposition seems obvious: yet there are many people on the Ohio river who mantain that, inasmuch as we have imported our black walnut furniture, we should continue to send our walnut logs 3,000 miles round the capes of Florida and have them made into breakfast tables, and in a seaboard work-shop, for our own use—and there are many statesmen who contend that it is good economy to send our cotton and corn to Manchester and Glasgow, and take our pay in sheetings and shirtings, when it requires five times the labor to transport the corn, the cotton, and the cloth, than to make the cloth. We consume more coal in ge ting our staples and goods to and from a foreign market than is required to move the machinery where the goods are made. The carriers eat more food than the mill operatives.

We should and must manufacture at home because our labor is so costly, and because so much labor is required in the transportation of our heavy staples to our present markets.

slaves from Dongola and Sennaar, fixed their wages at thirty paras (less than 4 cents) a day, and compelled them to labor under the bastinado; but, even in the rudest fabrics, he could not compete at home with the English and Swiss manufacturer; because his laborers were ignorant; because compulsion could not beget ambition to excel; and because rewards (had they been offered) which could not be safely invested, and which could be taken away by the same hand that gave, were not inducements sufficiently strong to make the indolent active, or to fit the unintelligent for employments which require mental energy and mechanical care.

"And your committee are persuaded that the best service that could be rendered to the industrious classes of the community, would be to extend the field of labor, and of demand for labor, by an extension of our commerce.

"Your committee further recommend, that, as speedily as possible, the whole system of differential duties and of all restrictions should be reconsidered, and that a change be therein effected in such a manner that existing interests may suffer as little as possible in the transition to a more liberal and equitable state of things * * * the simplifications they recommend would vastly facilitate the transactions of commerce," &c., &c.

That is, to rely as their fathers did, and before their manufacturing age, on "the wooden walls of old England." Nature seems to have made the coasts, harbors, and estuaries of Great Britain for a peculiarly maritime people. Here is her *natural* strength. Her energies were partially turned aside from this interest, for half a century, by the inventions of Arkwright, Newcomen, Watt, and others, and from the possession of the cheapest fuel *then* known, by which these inventions could be turned to profit. But it is evident that Mr. Hume and his committee think more of the fisheries and the carrying trade than of cotton cloth as the sources of future support and profit to England.

Evidence.—Extracts from the evidence of Mr. McGregor, one of the secretaries of the Board of Trade; Dr. Bowring; Mr. Hume, of the Board of Customs and Board of Trade; and J. Benj. Smith, President of the Board of Commerce of Manchester, and others:

"The German grazier now exchanges his cattle and his beef for fabrics with the home manufacturer, and the corn dealer and miller provide bread for the manufacturer, and take and use his goods in return; they produce, in most instances, as cheaply as we do, notwithstanding our skill and cheap coal, because they have abundance to maintain life within themselves. The artisan, in the cotton manufacture, can support himself with equal comfort in Germany at half, and in Westphalia, Bavaria, and Austria, at less than half. of what it costs the English artisan."

The Germans and Bavarians come yearly to the West, in thousands, attracted by our cheap lands and cheap living—and we have far cheaper coal than can be found in England.

"*The workman of England has to pay, in one way or another, more than half his wages in taxation.* A workman in Saxony, who is almost entirely free from tax, can live as well upon 5s. a week as an English artisan can live upon 9s. a week."

Yet one of the inducements that the West holds out, and which brings the Saxon emigrant, is light taxes.

"The state of Swiss manufactures is now such that their cotton goods come into competition with ours, and meet us with very great advantages, in our Eastern markets: and they are sent to the United States and the Brazils in very large quantities, although the cost of carriage on the cotton must cost them double what the Lancaster and Lancastershire manufacturer pays."

Light taxes and cheap living explain the success of the Swiss manufacturer.

"Of late years there is a tendency for capital and labor to quit this and settle in other countries; in so much so, that all the cotton factories in the neighborhood of Vienna, in consequence of the cheapness of provisions, are in a very fair and prosperous condition; but the directors and foremen of these manufactories are chiefly Englishmen or Scotchmen, from the cotton manufactories of Manchester and Glasgow. We find in France, that the principal foreman at Rouen and in the cotton factories are from Lancaster; you find it in Belgium, in Holland, and in the neighborhood of Liege; you find British capital going into France, Belgium, and Germany, to a very great amount; and this very British capital employed there producing manufactures which meet us in the markets of the Mediterranean, the United States, Porto Rico, Cuba, South America, and the East Indies."

"Agents are constantly employed in the manufacturing districts, Birmingham, Nottingham, Leeds, Manchester, and Glasgow, in selecting the ablest workmen to go to foreign countries.

"We now cannot export to Switzerland Nos. of yarn under 110; the same process is going on in other countries."

"In Lancaster the wages have not increased with the price of provisions; wages never increase with the price of provisions, they always decline with a rise in the price of provisions, because a high price of food always diminishes the demand for labor, and the rate of wages is determined by the demand for labor."

In England the cotton weaver can do nothing but weave cotton; and his children are taught only to weave cotton. As the manufacturing operative, for several generations, was better paid than the agriculturist, this class has increased so as to outstrip the demand; the producers of food are now fewer than the consumers; the ratio of increase in both is the same, and, in consequence, the price of food must increase and the means of buying food must decrease.

Here, and under our system, the demand for any particular labor regulates the supply. The four years labor in the mill, instead of incapacitating the operative for other employments, has a very decided tendency to insure him success in other employments. In England the cotton spinner never expects to be a freeholder or to marry a freeholder; here the proceeds of labor in the mill are generally intended for the purchase of land and the necessaries in and about the house of the land owner.

The English rule will continue to obtain there, and, with the modifications suggested, is true here.

"The lower price of provisions induce many people not engaged in manufactures to settle abroad. There are four or five millions (twenty to thirty millions of dollars) annually drawn from the incomes of England spent in France alone, and a great amount in Italy; the city of Naples is almost entirely supported by English expenditure."

Much of this money doubtless goes to support the vices of Paris, but still an enormous amount is paid out by those who seek cheap food abroad.

Now if the nobleman, with a rent roll of thousands, goes to Italy to save some hundreds, what shall prevent the Manchester weaver from coming here (if he can get the means to remove) where he can have "a chicken in the pot" every day instead of only on Christmas and other church festivals; and here, with more and better food, he would do more and better work, and would soon catch the spirit of our own people and fit himself for independence on a farm.

Here are the *facts* which show us what of labor and capital we may expect from abroad whenever we choose to take the proper means to obtain it. That but little of English capital and of this kind of labor has hitherto come to this valley is not to be wondered at. I need not quote authorities to show how profoundly ignorant the English generally have been of the West. How few of them who have thought of Kentucky but in connection with the long rifle, and would not rather have trusted themselves to the *crése* of the Malay pirate than to the terrible Bowie-knife of Arkansas or Mississippi. Until the last year, when they were so liberally supplied with the corn of Indiana and Illinois, how few of them had ever heard of these States. Within the last twelve months, the lower and middle classes of Europe have acquired more knowledge of us and of our country than they ever had before. The immense quantities of breadstuffs and all kinds of provisions which we threw on them, on an unexpected demand, astonished them as much as the fall of manna did the Israelites; while the triumphs of our volunteers in Mexico gave them the highest opinion of our population. The contributions we sent them so freely, removed many of their prejudices and disposed them to think kindly of us. The bravery and success of our troops won their admiration. They see that our volunteers can fight as well before stone walls as behind cotton bales. A few years since they would have preferred employment among the French, "their natural enemies," and incurred the necessity of learning a language their class has always despised, to accepting employment here; *now* thousands of them would gladly come to the land where bread is so cheap and men are so brave.

There is but little of English capital and artisan labor in New England, but the reason is obvious: it will be remembered that, until the last ten years, England could profitably employ both at home, and since New England had nearly enough of both; and, besides, the Englishman and the Scotsmen, when they do go abroad, prefer to go where they can lead and not where they would be obliged to follow. Here, the position which their capital and skill would take, would not only gratify their pride but command the desired profits. Our ships built at and taking their departure from Western ports, and laden with Western products, will soon be well known at "Lloyd's," and every year will increase the variety and reputation of the products we ship to Liverpool and Glasgow.

The statistics of emigration are even now showing the results of the causes here enumerated.

The efforts of this committee and of the advocates of free trade, and the clamors of the people for the removal of restrictions on imports of food, have vastly changed the policy of England. The taxes on the manufacturer are now lighter and food is cheaper; but, while the church and poor rates are imposed and taxes are actually collected to pay interest on their national debt, it is preposterous to contend that Englishmen can compete with our cheaper food and cheaper power and nominal taxes, when employed in manufacturing our peculiar staples.

The third requisite is:

Reputation or good will, and a condition of society and laws adapted to a manufacturing district.

In other countries the "good will" of a position is often of more value than the capital invested, and reputation of a particular article has frequently outlived for years its intrinsic worth. But, in this country, where so many changes are constantly occurring, that "good will" is rarely set down as part of one's assets, and reputation seldom passes a single generation, and neither has as much influence in fixing the price of cotton goods, bar iron, or common jeans, as of Rodgers' knives or Collins' axes. Whatever of either our Western manufacturer deserves and desires to have, can be obtained by the appropriation of a small part of his savings for the use of your advertising columns.

It is admitted that no manufactory can succeed except under the protection of good laws, well administered, and with the influence of a controlling class of society favorable to such pursuits.

There are two kinds of manufacturing employments, and each requires a different position.

Of the population of London, Paris, and New York, perhaps a large majority are really manufacturers, for the jeweler, engraver, shoemaker, milliner, &c., &c., are really as much manufacturers as the weavers of cotton. This class requires and obtains a support from the classes of society who mainly distribute unproductive capital, and congregate in large commercial or fashionable cities. Many also can only find employment of really productive capital in such cities where there is an endless division and subdivision of labor, and where sales are made to order; such, for instance, as the optician, the mathematical instrument maker, &c. These classes need be under no particular discipline. They can choose their own hours for, and places of labor, and, as they work generally for money, they require no special protection from law.

Quite otherwise is it with what we usually term the manufacturing class, those who carry on, or work in large establishments which require heavy capital, both fixed and active, and where the labor of each operative in each establishment is dependent on, and is in immediate combination with the labor of others.

In all such establishments it is generally the fractions of savings in each department that produce dividends or profits. To make these savings, the *human* machinery in the mill should run as smoothly and with almost as little interruption as the iron.

It is mainly to the perfect organization and *esprit de corps* of the overseers and operatives in their manufacturing towns that the New England manufacturer owes his remarkable success. This cannot be had in places where other interests preponderate.

Manual labor, to be profitable, must be respectable, and even fashionable. The overseer of a cotton, or any other mill is not contented unless his rank in society is as high as that of his neighbor in any other employment. The factory girl works cheerfully and steadily where all her associates have the same hours of labor—the same amusements—the same objects of thought—who live in the same manner, and under the same general rules. Here the necessary restraints are not irksome, because they bear on all alike. To those who have ever been at Lowell and seen the practical workings of a perfectly organized manufacturing society, I refer for the correctness of these positions.

If we adopt the same system, our manufacturing towns or cities will be peculiarly such, and there will be of necessity the condition of society required, and this society will make the code of city policy best adapted to its wants.

So far as general laws are concerned, it will hardly be doubted but that the laws of Kentucky and Indiana are as favorable to manufactures as those of Massachusetts. The Legislatures of these states have always been ready to grant charters, and to pass any law required for the encouragement and protection of such interests; Indiana has now *the very same general manufacturing law* as that under which the Massachusetts manufacturer has been so profitably working for the last sixteen years.

The administration and execution of the law will depend on the character of each district.

As I firmly believe that the Lowell system is the only one which should be encouraged—I had almost said tolerated—in this country; as it is the only one which, while it will ensure large profits to the capitalists and high wages to the operative, is entirely congenial to the spirit of our institutions, and will not bring upon us and entail upon our posterity the thousand political, social, and moral evils, which other systems in other countries have engendered, and as I cannot so well describe what its details are as others have already done, I take the following extracts from a remarkably well written book, prepared with great care by Rev. Mr. Miles, entitled "Lowell as it was and is:"

Extracts from "Lowell as it was, and as it is," by Rev. Henry A. Miles; published in* 1845.

A LOWELL CORPORATION.

On the banks of the river, or of a canal, stands a row of mills, numbering, on different corporations, from two to five. A few rods from these, are long blocks of brick boarding-houses, containing a sufficient number of tenements to accommodate the most of the operatives employed by the Corporation. Between the boarding-houses and the mills is a line of a one story brick building, containing the counting room, superintendent's room, clerks and store rooms. The mill yard is so surrounded by enclosures, that the only access is through the counting room in full view of those whose business it is to see that no improper persons intrude themselves upon the premises.

Thus the superintendent, from his room, has the whole of the Corporation under his eye. On the one side are the boarding-houses, all of which are under his care, and are rented only to known and approved tenants; on the other side are the mills, in each room of which he has stationed some carefully selected overseer, who is held responsible for the work, good order, and proper management of his room. Within the yard, also, are repair shops, each department of which, whether of iron, leather, or wood, has its head overseer. There is a superintendent of the yard, who, with a number of men under his care, has charge of all the out-door work of the establishment. There is a head watchman, having oversight of the night watch, who are required to pass through every room in the mills a prescribed number of times every night.

This, then, is the little world over which the superintendent presides. Assisted by his clerk, who keeps the necessary records, by the paymaster, who, receiving his funds from the treasurer of the Corporation, disburses their wages to the operatives, and not forgetting even the "runner," as he is called, who does the errands of the office, the superintendent's mind regulates all; his character inspires all; his plans, matured and decided by the directors of the company, who visit him every week, control all. He presides over one of the most perfect systems of subdivided and yet well-defined responsibility. Of course every thing depends upon the kind of man who fills such a post as this. No pecuniary considerations have ever stood in the way of the appointment, by the Corporations, of the best men who could be found. To their remarkable and universally acknowledged success in this respect, to their selection of individuals highly distinguished both for their general force of character, and for their integrity, conscientiousness, and magnanimity, is Lowell chiefly indebted, both for the profitableness of her operations, and the character which she has sustained.

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A LOWELL BOARDING-HOUSE.

Each of the long blocks of boarding-houses is divided into six or eight tenements, and are generally three stories high. These tenements are finished off in a style much above the common farm-houses of the country. and more nearly resemble the abodes of respectable mechanics in rural villages. They are all furnished with an abundant supply of water, and with suitable yards and out-buildings. These are constantly kept clean, the buildings well painted, and the premises thoroughly whitewashed every spring, at the Corporation's expense. The front room is usually the common eating-room of the house, and the kitchen is in the rear. The keeper of the house, (commonly a widow, with her family of children,) has her parlor in some part of the establishment; and in some houses there is a sitting-room for the use of the boarders. The re-

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*In several of the foregoing articles reference has been made to the Lowell system. These extracts, from the very clever book of Mr. Miles, show what that system is, how it works, and *why* it works well.

mainder of the apartments are sleeping-rooms. In each of these are lodged two, four, and in some cases six boarders; and the room has an air of neatness and comfort, exceeding what most of the occupants have been accustomed to in their paternal homes.

Operatives are under no compulsion to board in one tenement rather than another; it is for the interest of the boarding-house keeper, therefore, to have her bill of fare attractive. And then, as to the character of these boarding-house keepers themselves, on no point is the superintendent more particular than on this. He has generally a great liberty of choice of tenants. Applications for these situations are very numerous. The rents of the company's houses are purposely low, averaging only from one-third to one-half of what similar houses rent for in the city. In times of pressure a part of this low rent, and in some instances the whole of it, has been remitted. There is no intention on the part of the Corporation to make any revenue from these houses. They are a great source of annual expense. But the advantages of supervision are more than an equivalent for this. No tenant is admitted who has not hitherto borne a good character, and who does not continue to sustain it. In many cases the tenant has long been keeper of the house, for six, eight, or twelve years, and is well known to hundreds of her girls as their adviser and friend and second mother. Though the price of board is low, at present but one dollar and twenty-five cents for female, and one dollar and seventy-five cents for male boardors, yet many of them, aided by the cheap rents just alluded to, and by prudent and judicious management, have paid off old debts, have educated sons and daughters, and have made a comfortable provision for old age.

It is this system to which we especially referred in our previous chapter on Waltham. By it the care and influence of the superintendent are extended over his operatives, while they are out of the mill, as well as while they are in it. Employing chiefly those who have no permanent residence in Lowell, but are only temporary boarders, upon any embarrassment of affairs they return to their country homes, and do not sink down here a helpless caste, clamoring for work, starving unless employed, and hence ready for a riot, for the destruction of property, and repeating here the scenes enacted in the manufacturing villages of England. To a very great degree the future condition of Lowell is dependent upon a faithful adhesion to this system; and it will deserve the serious consideration of those old towns which are now introducing steam mills, whether, if they do not provide boarding-houses, and employ chiefly other operatives than resident ones, they be not bringing in the seeds of future and alarming evil.

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WAGES.

Precise statements will hereafter be given of the average pay of male and female hands. Only some general views of this subject will now be offered. Operatives entering the mill at once receive pay. In other arts they are obliged to go through some expensive process of learning. The young woman from the country, employed at first as a spare hand, and a pupil to the business, receives fifty-five cents per week besides her board. Thus the companies educate nearly all their hands, and as these hands are entirely changed every few years, they have at all times thousands in their pay as mere learners. The female operative will, in a few months, earn four and six pence, one dollar, one dollar and a half, per week, according to her dexterity and diligence. While the average pay of all female operatives is, at the present time, about one dollar and ninety-three cents per week, beside board, instances are not uncommon of their earning three and four dollars per week.

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COMFORT AND HEALTH.

The general and comparative good health of the girls employed in the mills here, and their freedom from serious disease, have long been subjects of com-

mon remark among our most intelligent and experienced physicians *The manufacturing population of this city is the healthiest portion of the population*, and there is no reason why this should not be the case. They are but little exposed to many of the strongest and most prolific causes of disease, and very many of the circumstances which surround and act upon them are of the most favorable hygienic character. They are regular in all their habits. They are early up in the morning, and early to bed at night. Their fare is plain, substantial, and good, and their labor is sufficiently active, and sufficiently light to avoid the evils arising from the two extremes of indolence and over-exertion. They are but little exposed to the sudden vicissitudes, and to the excessive heats and colds of the seasons, and they are very generally free from anxious and depressing cares."

MORAL POLICE OF THE CORPORATIONS.

It has been seen what a large amount of capital is here invested, and what manifold and extensive operations this capital sets in motion. The productiveness of these works depends upon one primary and indispensable condition—the existence of an industrious, sober, orderly, and moral class of operatives. Without this, the mills in Lowell would be worthless. Profits would be absorbed by cases of irregularity, carelessness, and neglect; while the existence of any great moral exposure in Lowell would cut off the supply of help from the virtuous homesteads of the country. Public morals and private interests, identical in all places, are here seen to be linked together in an indissoluble connection. Accordingly, the sagacity of self-interest, as well as more disinterested considerations, has led to the adoption of a strict system of moral police.

Before we proceed to notice the details of this system, there is one consideration bearing upon the character of our operatives, which must all the while be borne in mind. *We have no permanent factory population.* This is the wide gulf which separates the English manufacturing towns from Lowell. Only a very few of our operatives have their homes in this city. The most of them come from the distant interior of the country, as will be proved by statistical facts which will be presented in a subsequent chapter.

To the general fact, here noticed, should be added another, of scarcely less importance to a just comprehension of this subject—*the female operatives in Lowell do not work, on an average, more than four and a half years in the factories.* They then return to their homes, and their places are taken by their sisters, or by other female friends from their neighborhood.

Here, then, we have two important elements of difference between English and American operatives. The former are resident operatives, and are operatives for life, and constitute a permanent, dependent factory caste. The latter come from distant homes, to which in a few years they return, to be the wives of the farmers and mechanics of the country towns and villages. The English visiter to Lowell, when he finds it so hard to understand why American operatives are so superior to those of Leeds and Manchester, will do well to remember what a different class of females we have here to *begin* with—girls well educated in virtuous rural homes; nor must the Lowell manufacturer forget, that we forfeit the distinction, from that moment, when we cease to obtain such girls as the operatives of the city.

To obtain this constant importation of female hands from the country, it is necessary to secure *the moral protection of their characters while they are resident in Lowell.* This, therefore, is the chief object of that moral police referred to, some details of which will now be given.

No persons are employed on the Corporations who are addicted to intemperance, or who are known to be guilty of any immoralities of conduct. As the parent of all other vices, intemperance is most carefully excluded. Absolute freedom from intoxicating liquors is understood, throughout the city, to be a pre-requisite to obtaining employment in the mills, and any person known to be addicted to their use is at once dismissed. This point has not received the

attention, from writers upon the moral condition of Lowell, which it deserves; and we are surprized that the English traveler and divine, Dr. Scoresby, in his recent book upon Lowell, has given no more notice to this subject. A more strictly and universally temperate class of persons cannot be found, than the nine thousand operatives of this city; and the fact is as well known to all others living here, as it is of some honest pride among themselves. In relation to other immoralities, it may be stated, that the suspicion of criminal conduct, association with suspected persons, and general and habitual light behavior and conversation, are regarded as sufficient reasons for dismissions, and for which delinquent operatives are discharged.

Any description of the moral care, studied by the Corporations, would be defective if it omitted a reference to the overseers. Every room in every mill has its first and second overseer. The former, or in his absence the latter, has the entire care of the room, taking in such operatives as he wants for the work of the room, assigning to them their employment, superintending each process, directing the repairs of disordered machinery, giving answers to questions of advice, and granting permissions of absence. At his small desk, near the door, where he can see all who go out or come in, the overseer may generally be found; and he is held responsible for the good order, propriety of conduct, and attention to business, of the operatives of that room. Hence, this is a post of much importance, and the good management of the mill is almost wholly dependent upon the character of its overseers; It is for this reason that peculiar care is exercised in their appointment. Raw hands, and unknown characters, are never placed in this office. It is attained only by those who have either served a regular apprenticeship as machinists in the repair shop, or have become well known and well tried, as third hands, and assistant overseers. It is a post for which there are always many applicants, the pay being two dollars a day, with a good house, owned by the company, and rented at the reduced charge before noticed. The overseers are almost universally married men, with families; and as a body, numbering about one hundred and eighty, in all, are among the most permanent residents, and most trustworthy and valuable citizens of the place. A large number of them are members of our churches, and are often chosen as councilmen in the city government, and representatives in the State Legislature. The guiding and salutary influence which they exert over the operatives, is one of the most essential parts of the moral machinery of the mills.

Still another source of trust which a Corporation has, for the good character of its operatives, is the moral control which they have over one another. Of course this control would be nothing among a generally corrupt and degraded class. But among virtuous and high-minded young women, who feel that they have the keeping of their characters, and that any stain upon their associates brings reproach upon themselves, the power of opinion becomes an ever-present, and ever-active restraint. A girl, *suspected* of immoralities, or serious improprieties of conduct, at once loses caste. Her fellow-boarders will at once leave the house, if the keeper does not dismiss the offender. In self-protection, therefore, the matron is obliged to put the offender away. Nor will her former companions walk with, or work with her; till at length, finding herself everywhere talked about, and pointed at, and shunned, she is obliged to relieve her fellow-operatives of a presence which they feel brings disgrace. From this power of opinion, there is no appeal; and as long as it is exerted in favor of propriety of behavior and purity of life, it is one of the most active and effectual safeguards of character.

NOTE.—The water power and site of Lowell was purchased by the Locks and Canals Company, the parent of all the other corporations. This company has furnished power, site, buildings and machinery to the manufacturing companies; it has built churches, school houses and lyceums; has made streets, and done whatever was needful for the health, the morals, or the intellectual improvement of the citizens.

Here is the best pattern of a manufacturing city the world has ever seen. Elsewhere there have been reverses—in Lowell no corporation has ever become embarrassed, or failed to meet its obligations, or been obliged to suspend its works; elsewhere, and where the same system has not obtained, operatives have too often become poor and degraded and a burthen on the surrounding country; there the neighboring farmers, while they obtain high prices for what they grow, are not taxed to maintain a numerous police and crowded poor-houses; elsewhere the moral and intellectual condition of the operative is of slight concernment to the employer—but the Lowell corporation has, with such an enlightened self interest, provided so liberally for the improvement of those they employ—in the building and needful support of churches—schools and lyceums, that many have been attracted there "less through any necessity of their circumstances, than from a desire to avail themselves of the advantages which are there enjoyed."

If, having the cheapest power, the cheapest food, and the cheapest materials, we can manufacture the cheapest goods—and if the Ohio is to be the seat of large manufacturing cities, how important it is to ourselves and to the whole country to start fair and to adopt that system which promises to the capitalist the largest profits and the best protection of property, and secures to the operative the highest wages and those religious, mental and social advantages that are far more important to him and to society than high wages.

SUMMARY

Of the advantages of manufacturing Cotton where the seams of the Illinois Coal field are cut by the lower Ohio.

We have the following data as elements of the calculation.

A mill of 10,000 spindles will consume 666 tons of cotton, make 600 tons of cloth, and use 24,000 bushels of coal, 2,530 gallons of oil, and 46,000 pounds starch per annum; it will require of operatives 25 men and boys and 200 females, whose wages will average the Lowell prices—say, males 80 cents per diem and females $2 per week, besides board, or males $6,000, females $20,800 per annum. The average prices of board at Lowell are per week for males $1 75 and for females $1 25—or total per annum $17,375.

It is safe to assume that the prices of board on the lower Ohio would be one third less than at Lowell where a sirloin of beef costs from 15 to 17 cents the pound, potatoes from 60 cents to $1 per bushel, and most of the other articles of food in the same proportion. It will be remem-

bered that the rents of the boarding houses at Lowell are regulated by a "sliding scale," and are dependent on the general prices of food—sometimes these have, as is said, been entirely abated, and the boarding house keepers have received gratuities from the corporations, so as to make a living without changing the prices of board,—and it is fair, therefore, to include the cost of board as a part of the wages paid by the corporations.

We have before, on page 38, average saving in cost of transportation and interest on difference of capital.....	$47,182 80
Add difference of 1-3 in cost of board on $17,375.....	5,791 06
Add difference of 19 cents per bushel on 24,00 bushels of coal.....	4,560 00
Total saving per annum.....	$54,533 86
Deduct $1 50 per ton, supposing the goods are to be sold at Louisville, St. Louis, or Memphis.....	900 00
	$53,638 86
If, to save all cavil, we deduct 3 per cent. to cover interest, insurance, and commission on sales at these cities on 4,000,000 yards at 8 cents—or $320,000.....	9,000 00
	$44,633 86

We have a clear saving of over 17 per cent. on $300,000, which is an ample capital.

I am informed by those who have the means of knowing the fact, that the average dividends declared on cotton mills controlled in Boston, have been 14 per cent. for the last five years—but I am not advised of

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If lard oil is used we have the advantage of 15 cents per gall.—but if the use of sperm oil is continued we pay an advanced price of 15 cents. per gall.. or $379 50. We should, however, save about 1 cent per lb. in the price of starch, or $460. and in flour, wood, gas (or lard oil for lamps) probably $600. per annum.

On page 17 of this appendix it was stated that a mill of 10,000 spindles would manufacture 750 tons of cotton sheetings and shirtings, No. 14, yearly, or 840 tons of cotton. The operatives would be about 43 men and 229 women and children. The fuel required in and about the mill per annum, say 50,000 bushels.

We have an advantage over Lowell in the cost of transporting this 840 tons of cotton of *at least* $20 per ton, or.....	$16,800
And in laying down the goods in Louisville or St. Louis of over $30. per ton, or	22,500
And in coal of over 15 cents per bush. or.....	7,200
And in starch, oil, and wood, of over.....	1,000
Or a total of.....	$47,500

Exclusive of difference in the cost of board.

The amount of work and labor here stated is about the average of that at the cotton mills of Lancaster, Graniteville, and at other positions where new and improved machinery is used.

the amount of earnings in these mills that has been added to surplus funds, or invested in new machinery, improvements, property or new stock:*

If the *maximum* of advantages is taken and added to 20 per cent. average of earnings of eastern mills, (and it is believed that this calculation would be nearer the truth) the estimated profits here would be so enormous that western men could scarcely be brought to believe the accuracy of the calculations without the severest tests of experience.

Several months since, and before these articles were written, I sent the results to a friend and practical manufacturer of cotton on the Ohio. His answer was this:

"An Irish laborer once wrote home to his friends that he got meat for his meals three times a week.

" 'Why, you lying dog,' said his employer, "do you not get meat three times a day and every day?"

" 'Yes,' said the laborer, 'but I want my friends to come and join me. Meat three times a week will bring them here, but if I promise it three times a day they wont believe a word of it.'"

Another practical manufacturer in the West writes to me that the calculations are substantially correct, and the results within the truth, but that a model mill, on the Lowell system, is required to convince the western capitalists of these truths.

Possibly these gentlemen may be right in their opinions; but such is not my estimate of the intelligence and enterprise of western and southern men: but if they should prove all disciples of St. Thomas, and require for conviction, the evidence of *each* of the five senses it will not be long before northern and eastern men will occupy the field and show them the model and the way it works. Many persons who have read these papers with some attention have said "all these calculations and inferences may be true—we cannot gainsay either—but if they are true, why have we not seen them before? Why have our people been blind so long to these great advantages," &c.

This objection is natural enough to those whose attention has never been specially directed to this subject.

This is the answer. We have only had the most important of these advantages for two or three years. Within that time it has been found that our steam power was cheaper than the eastern water power—within that time the labor in the mill has been diminished one-half—within that time we have accumulated a large part of the capital we have now to spare for manufacturing purposes—and within that time many circumstances have occurred to bring our valley to the notice of those whose skill and labor and capital we need. Besides, how few there are here or abroad who know anything of the extent or cost, or accessibility of

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*Mr. A. A. Lawrence, in the December No. 1849, of Hunt's Merchant's Magazine, states the average dividends of 26 first class mills in Massachusetts and New Hampshire for the preceding 11 years at 8 and 9-10ths per cent. per annum. No statement of the actual earnings of these mills has been made.

the coal on the Lower Ohio—and although its field is 70,000 square miles in extent, it has not yet found a place in the school geographies.

It could not have been expected that the New England manufacturer, or Pennsylvania coal owner would advertise our advantages if he knew them—neither can we complain that our Pittsburg friends have desired the continuance of our profitable custom. They who have built cotton mills at Cincinnati and elsewhere along our river have had their individual interests only to subserve and cared not to encourage competition.

It will be observed that in this summary of advantages, only the important items of savings have been carried out. Except some trifling materials which go into the fabric of cotton—such as dye-stuffs, acids, and some other "chemicals," we have the advantage in every particular—or should have as soon as the work was fairly started—from the digging of the foundation of the mill to the lading of the steamboat with the goods; and, indeed, far beyond this, for we shall be able, within sight of the mill, to build ships from the keelson to the maintruck, and fit them out 25 per cent. cheaper than they can be built on the seaboard from Passamaquoddy Bay to the river Neuces, and send them laden with our manufactured goods to every port where our flag can float.

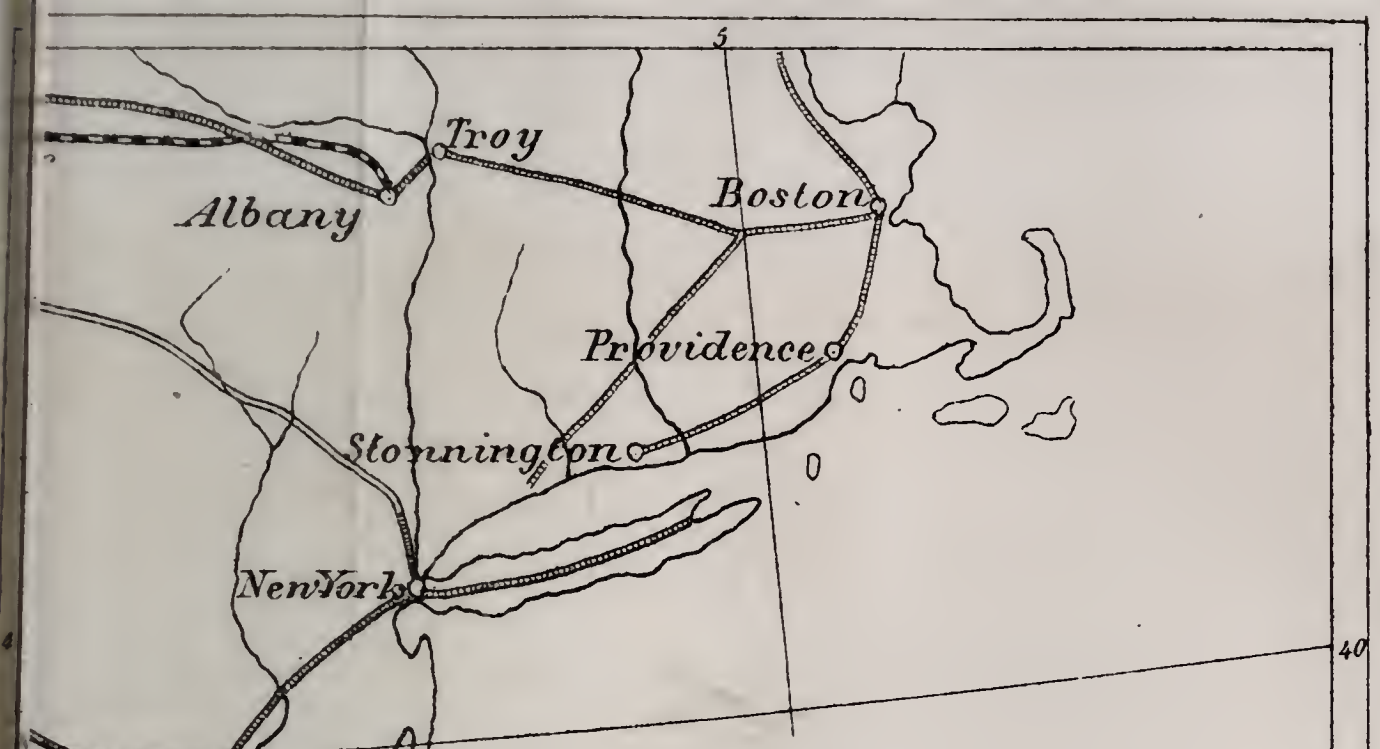
The axiom that the cheapest food, the cheapest power and the cheapest materials will produce the cheapest goods is one which even the tyro in political economy can fully comprehend.

CANNELTON, AND ITS ADVANTAGEOUS POSITION.

To show the central position of Cannelton in reference to the natural and artificial channels of inter-communication; to the certain and cheap supply of food, cotton, wool, hemp, timber, iron, lead, copper, &c., I have prepared the following outline map:

According to the able Report (No. 441, H. R.) made in 1844, by Gen. Armistead and Col. Long, there are, on the Mississippi river and its tributaries, 17,169 miles of steamboat and 747 miles of canal navigation, and the hydrographical or commercial centre is at a point near the mouth of the Ohio. The strong points they make for the establishment of an armory on the Lower Ohio apply with equal force to the establishment of cotton, hemp, woollen, and iron mills. These are:

The superiority of steam over water power; the facility of procuring articles of subsistence and all other necessaries; the facility of distribution; the prospective healthfulness of the site; the obtaining of mineral and agricultural supplies by *descending* navigation; the certainty of obtaining supplies of iron, lead, &c., from Tennessee, Missouri, and Illinois, and by rivers whose navigation to the points of supply is rarely obstructed; and the fact "that the point at which supplies of all kinds furnished by the Western country can be had in the greatest abundance and variety, and at the cheapest rates, is nearly or quite coincident with that designated as the commercial centre; with respect to this point, it should moreover be observed, that in the event of a dearth in one portion of the vast region above it, and plenty in another, (which is likely



OUTLINE MAP

of the

APPALACHIAN & ILLINOIS

COAL FIELDS

and the position of the most important

CITIES, RIVERS, RAIL ROADS & CANALS

in the valley of the Mississippi.
and the relative position
of

CANNELTON

Rail Road	*completed*	═══
" "	*unfinished*	═══
Canals	*completed*	▬▬▬
"	*unfinished*	═══

Lith. of Milne & Bruder, Louisville

35

30

0 3

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Rail Road completed
" " unfinished
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Lith. of Milne & Bruder, Louisville

Galena
Chicago
L. MICHIGAN
St. Joseph
Detroit
LAKE ERIE
Buffalo
Dunkirk
Erie
Cleveland
Sandusky
Rochester
Albany
Troy
Boston
Providence
Stonington
NewYork
Philadelphia
Baltimore
Washington
Pittsburg
Wheeling
Mississippi River
Lead Mines
Illinois River
LaFayette
Springfild
T. Haute
Indianapolis
Cincinnati
Missouri River
St. Louis
Vincennes
White R.
Madison
New Albany
Cannelton
Ohio River
Kentucky R.
Louisville
Lexington
Salt R.
Evansville
Iron and Copper Mines
Iron
Cairo
Paducah
Lead Mines
Tennessee R.
Nashville
Richmond
Petersburg
Weldon
Norfolk
Raleigh
Wilmington
Columbia
Athens
Atlanta
Hamburg
Charleston
Macon
Savannah
Memphis
Arkansas River
Mississippi River
Huntsville
Vicksburgh
Alabama River
Mobile
Pensacola
New Orleans
Cotton Parallel North
Cotton Parallel South

to be the case more or less frequently) supplies of provisions, &c., can be had with more certainty, and at a cheaper rate, at an entrepot in its vicinity than at any other point."

This is a view worthy of special consideration. Droughts, rains, and floods, cannot be expected at the same time to affect the alluvions of the Mississippi, Wabash, Ohio, Tennessee, and Cumberland rivers, whose *descending* products nearly approach the commercial center.

The railroads made since 1844 will bring this commercial centre of the Mississippi valley near Cannelton.

The following article, from the American Railroad Journal, of May 4, 1850, traces the route of a railroad which Nature herself has indicated by unmistakable signs:

Railroads and Manufacturing in the West.—In our paper of the 20th ult. we endeavored to urge upon the people, engaged in the construction of railroads, the great importance of manufacturing the materials of their construction. We again recur to this subject for the purpose of showing the peculiar adaptedness of our country for manufacturing pursuits, particularly the West; and the influence of our vast coal fields—the great repository of power—in giving direction to our industry and in developing our resources.

Up to 1847, the Indiana railroad system was wholly based on agricultural surplus products and foreign travel. For instance, the Madison road was the result of an obvious necessity of cheapening the transportation of the heavy, bulky and perishable staples of central Indiana to the Ohio river; the line from Terre Haute eastwardly was organized to be a portion of the line extending from the seaboard to the Mississippi, and at first but little importance was attached to its home business. The Madison road has proved highly profitable to its stockholders, and beneficial to the section of country through which it passes. The appreciation of lands within five miles on either side of it has, as is said, been far greater than the entire cost of the road. This was the obvious consequence of increased and cheaper facilities of removing the surplus products of the land to a market. The new routes from Lawrenceburg, Jeffersonville, New Albany and Evansville, that are now being pushed forward with vigor, (chiefly by the aid of landholders along the respective lines) to the interior counties, are the results of the benefits and success of the Madison road.

Notwithstanding all that was said of the vast amount of travel that would pass over a road from St. Louis to the seaboard and on the same parallel, the Terre Haute line moved along at a snail's pace, and the Vincennes route was abandoned. It was evident that through passengers and light freights would not pay dividends, and that lines of inter-communication, to be highly profitable, must connect districts of exchangeable commodities.

Since 1847, however, new elements of railroad progress have been developed in this State, and must, to a great extent, direct and control the movement in question.

The margin of the Great Illinois Coal Basin, as will be seen by referring to the geological map of Dr. Owen, is cut by the Ohio river a little east of the mouth of Anderson river, and by the Wabash about 15 miles north of the mouth of Coal creek. Its line is slightly curviliniar and passes through the western sections of the counties of Lawrence and Monroe, and extending northwest, approaches within 50 or 60 miles of the head of Lake Michigan.—It will be observed that this line passes through the rich alluvions of the Patoka, north and south forks of White, Elk, Raccoon, Wabash and Vermillion rivers, that are not surpassed in fertility by any lands in the world, and which, perhaps, have a food producing capacity equal to the wants of all the manufacturers of Europe and America. Along this margin are coals, potter's marle, fire and building sandstones, limestone, ironstone, and bog iron ore, all in close proximity, and above the plane of high water, all of the best qualities and inexhaustible quantities. Such an important line of power and materials cannot, as we apprehend, be found elsewhere on the globe. None can come near it,

except, possibly, the western margin of the Appalachian coal field in Tennessee, Georgia and Alabama. Perhaps that district has coal and iron fully equal, but it has not the same food producing capacity.

It will be further remarked that this line runs, for some 300 miles, nearly north and south: that it passes parallels of different staples and of exchangeable products; that, at its southern terminus on the Green river in Kentucky, it is within an hundred miles of the cotton district; that it passes the great natural highways of the central sections of this valley, and over the tobacco, the hemp, flax, corn, and wheat districts; that at the northern point, south of Chicago, it almost touches the great chain of our northern lakes; that it comes within an attractive distance of the rich copper ores of Lake Superior, and that it runs into the lead district; it lies wholly in the temperate zone, and cuts the commercial and hydrographical centre of the great valley of the Mississippi.

Now, when we examine the map of Europe, and observe the concentration of captal and population—the railroads and canals—over the coal fields from the Severn to the Ribble: from Solway Frith to the Tyne and the Tees, and from Valenciennes to Leige; when we notice the growth of Cumberland and Pottsville, of Pittsburg and Wheeling, and many other towns on the margin of the Appalachian coal field, we cannot but see that this margin of the Illinois coal field, so central and in so rich a food producing country, must inevitably and in a short time, become a great seat of manufacturing and railroad enterprise.

When the Terre Haute line was nearly abandoned, it was ascertained that Indianopolis and the rich district around it, could afford to transport coals from this margin, and the work was renewed with vigor. In a few years it will be completed, and will enable Indianapolis to obtain fuel and motive power at one half the cost of either in Providence or Philadelphia. Manufacturing towns must spring into existence where the road cuts the beds of iron and coal. The Madison road is now pushing forward a branch to intersect this mineral district beyond Bloomington; the Jeffersonville road will form a connection with that branch; the New Albany road will cut the coal and iron strata near Bedford; the Evansville road will pass through one of the inner strata of the great basin. The Wabash and Erie canal, at several points between Evansville and Point Commerce, passes through solid walls of coal, iron and fire clay; the Mount Carmel and Vincennes routes will soon connect the lower Wabash with these rich deposits. Wherever these lines do intersect the margin of this coal field, there will be manufacturing towns; and by and bye these towns will be connected with each other by a continuous road from Cannelton, near the mouth of Anderson river, on the Ohio, to Chicago. This, extended into Kentucky, eventually will—nay *must*—be the most important railroad line in the State, if not in the world. It will be over 300 miles in length; it will connect the lakes with the Ohio, and, joining the main lines of road between the Mississippi and the Allegheny mountains, it will connect the cotton, tobacco, hemp, subsistence and mineral districts.

It will, by and by, be fully understood that, other things being equal, the true lines of artificial communication, especially when they are of any considerable length, are north and south, and to connect districts of exchangeable commodities, and people of different climates. The valley of the Mississippi is so level and expanded that natural forces and affinities can and will be exerted with their full power. That valley, as Mr. Webster has recently and forcibly said, is soon to be America. It will soon have a population and wealth far beyond the seaboard States. It is idle, then, for the seaboard cities to expect that their roads, running west and on the same parallels, are to be the main lines of commerce and travel in that valley. No artificial highway is likely to compete with the Father of Waters; for, even with every facility for making railroads, it is not probable that the western people can ever reduce freights on their roads to less than one cent per ton per mile. The rates of steamboat freights now average less than four mills per ton per mile, and as business increases: as coal is substituted for wood as fuel, and as greater system prevails, these rates must be largely reduced. The main trunk, or stem in that valley with which all others will connect, must be from the lakes to the Gulf, and over

the best route between the Appalachian chain of mountains and the lowlands of the Mississippi and its large eastern tributaries. This route, as we apprehend, will be on or near the margin of this Illinois coal field and by the Appalachian coal fields near Chattanooga. Perhaps there will be no need of more than this stem through Tennessee and Kentucky. South of the line of the former, the road will connect with New Orleans, Mobile, Charleston and Savannah—north of the line of the latter it will connect with Upper Mississippi, Lake Michigan and Lake Erie. The artificial system of intercommunication will there be a perfect whole. The territory thus connected, has a capacity of providing food and clothing and materials for shelter to hundreds of millions of people, and then to supply the rest of the world with fabrics of cotton, wool, and iron. The internal commerce of that territory will far exceed the foreign commerce of the world.

Perhaps, for the first time in his history, man will then have full "verge and scope" to develope all his strength. Society there will be the commingled offspring of man—the most vigorous shoots from Saxon and Norman and Frank and Gothic stems have been planted in that fertile soil. From the shore of the Gulf of Mexico to that of Lake Superior will be acclimated almost every tree, shrub, plant and root that are desired by necessity, convenience, and luxury, while the riches of almost every mine will be within easy reach. The mind of man has powers too limited to define the progress and foretell the destiny of that valley and that people.

The natural centre of this great road is at or near Cannelton, or where the coal margin and the road are cut by the Ohio river. The elements to be combined in manufactured articles along the line of this road, will exert attractive forces in about the following order:

Food—
- Vegetables, or the largest bulk of subsistence.
- Fruits, that will not bear transportation.
- Animals, to furnish fresh meat, such as poultry, veal, lamb, &c.
- Cereals.

Minerals—
- Iron ore.
- Pit coals.
- Copper ore.
- Lead, &c.

Fibrous staples—
- Wool.
- Hemp and flax.
- Cotton.

The climate and soil most favorable to the production of vegetables, fruits and hemp, are between the parallels of 35 and 40 deg. In the same district the grasses are most abundant and pasturage of longer duration. Animal food is therefore cheaper here than in more northern or southern latitudes.

The cereals flourish best north of 40 deg., and the cotton plant is most luxuriant between 31 and 35 deg.

In the charitable establishments in England, the amount of food allowed to each person (generally children and old persons who take but little exercise) varies from 500 to 750 lbs. per annum. The average consumption of food by our manufacturing operatives will probably exceed 1000 lbs. per annum, of which the largest portion will be bread, fruits, vegetables and milk: the food of the horses, cows, and other ani-

mals which must necessarily be near these operatives, would, in bulk and weight, be much larger. The cotton mill of 10,000 spindles requires and will support a population of at least 2000.

Here, then, we can approximate the relative importance of the materials that are combined in 840 tons of cotton cloth, No. 14.

Food of man and beast at least 2000 × 2000 = 4,000,000 lbs. or	2,000 tons,
Coal, 50,000 bushels, or say	1,600 "
Cotton, say	900 "

Without taking into view the uses of the coal for domestic and other purposes about the mill, it is seen here that it is economy to move the cotton to the coal, and, if they cannot be found together, to move the cotton and the coal to the food. This illustration is the one most favorable for the manufacturers at the extreme north and south of the line laid down. To make finer cloth we need relatively more labor, more food and more power. To make bar iron the difference is still greater; while to make steel and the nicest fabrics of cotton, wool, iron, &c., the amount and cost of the raw material sinks into insignificance when compared with the amount and cost of the food and of the fuel for heat and power.

To recur again to this outline map it will be seen that the line of the mineral district from, say Covington, Ind., to Rumsey, Ky., is in the very heart of the best food producing district on earth, and that this food and coal, clays, building stone, iron, &c., must attract the cotton. It will be noticed that Cannelton is at a central position where this line is crossed by the Ohio River and where food and materials can be discharged from steamboats freighted at the bases of the Alleghany and Rocky Mountains, on the shores of the Gulf of Mexico, and at the north as far as the Falls of St. Anthony. There must eventually be a great mart of exchange as well as the chief seat of manufactures of this valley. It has vastly more natural advantages for manufacturing than Manchester, Birmingham or Sheffield, in addition to great commercial advantages The money and labor that have been expended in improving the navigation of the Mersey, in building the Liverpool Docks; in embankments and excavations to connect that port with the coal mines of Lancaster, and in sinking shafts to and cutting "adit levels" from these mines, would build a city on that section of the Ohio larger than all the cities of Lancaster. The very labor employed in transporting stone from Scotland and the English channel to Liverpool would here build mills enough to work up half our cotton crop; and the greater taxes paid by these English cities within the present century would more than fill these mills with the most improved machinery.

I shall not attempt to fix the period of time when the great city of the West will be at the point here designated. As every country progresses in civilization, the tendency of population and wealth is to concentrate in manufacturing cities. Macauley has graphically described the rapid changes that occurred in England after the invention of the spinning jenny, power loom and steam engine, when "a constant stream

of emigrants began to flow to the regions north of the Trent that possessed, in their coal beds, a source of wealth far more precious than the gold mines of Peru."

In the last quarter of a century the changes have been equally great in New England. Had the power of Lowell, Nashua, Pawtucket, and Hadley been found on the Lower Connecticut, Hartford or Middleton would now be the great city of New England, and Boston might have retrograded. Had the eastern margin of the Appalachian coal field touched the navigable shores of the Delaware or Chesapeake Bay, at that point would now be the chief manufacturing and a great commercial city of our seaboard. No one can, for a moment, doubt the correctness of these positions. That country compared with ours is barren and stationary. The sites on the seaboard have but one back country. The Lower Ohio has a navigation more safe and subject to fewer interruptions than the Connecticut or Delaware, and cities on its banks would be at the centers of great supporting circles. The like causes must produce like effects. The greater here must be as important as the lesser there.

Some of these views are more fully expressed in the following extract from a recent editorial of the Cincinnati Price Current.

Western Manufactures.—The ruling prices of cotton, for a series of years preceding the present, were exceedingly low, even when compared with other leading staples of the country. As a consequence, the cotton planters, and those who depended on the market for hemp, stock, food, &c., in the plantation States, have become conscious of the necessity of diversifying their pursuits and encouraging home manufactures. Cotton mills have been springing up at various positions in the south and west; and now, at favorable positions, such as Graniteville, S. C., Augusta, Ga., and Cannelton, Ind., systematic efforts are being made to lay the foundations of manufacturing cities. Indeed, we are now taking precisely the same steps that England, Belgium, and New England have already taken—the same causes that have built Manchester, Birmingham, Ebberfield, Lowell, &c., are now operating in this valley, and with immense power, and if our cities, when surrounded by a sparse population, and only required for the purposes of factorage, grew up with unexampled rapidity, what may we not expect when our clothes, hardware, &c., are made at home. One of our merchants can sell the product of the constant labor of a thousand manufacturers. We shall not lose the merchant, but we shall attract the thousand manufacturers. Our expanding markets, peaceful and secure government, light taxes, abundant food, cheap materials, and genial climate, wonderful facilities of intercommunication, are all combining to make the central section of this valley the chief seat of manufactories in the world. We now control the cotton commerce, and our exports of cotton will average, in value, over forty millions of dollars yearly. When we export (as we soon shall) cotton yarns and cloth, instead of raw cotton, the value of these exports will average yearly over 200 millions dollars.

It is, however, argued that the cheap labor and capital of olden countries will enable them to retain their monopoly of the cotton manufacture.

The same arguments were used when England began to receive the weavers of Flanders, when Slater was erecting his cotton frames in Rhode Island, and when lighter taxes and cheaper food in Belgium, Saxony, and Switzerland were attracting cotton machinery from England. We seem to forget that *natural* forces will always prove more potent than *artificial* forces; that men and money are more easily moved than iron, cotton, and food, and that the former need be moved but once, while the cost of moving the latter is perpetual.

Thus, better markets, cheaper food, and greater security to person and property induced to Flemish weavers to emigrate to England. The abundant

iron and coal of Great Britain were natural advantages that enabled her to defy all manufacturing opposition for more than a century, even while engaged in wars over the world, and while increasing her national debt to a sum almost beyond computation. But, when her population passed the practical limit of a home supply of food, and was pressed down with taxes, Belgium, Saxony, and Prussia opened their mines of coal and iron, and as soon as they could copy British machinery, successfully entered the field of competition; and had it not been for recent revolutions, and the insecurity of property on the continent, Havre, Amsterdam, and the Haus towns would now divide with England the imports of our great staple.

The growth of the cotton manufacture in New England was the result of a superabundant population; of lighter taxes; of convenient and abundant water power, which. in the infancy of steam power, had a decided advantage, and of greater proximity to the material and our home market. Compared with our own, these advantages do not now exist in New England. The power of steam is now, where coal can be had at 10 cents the bushel, cheaper than that of water. The steam engine now does far more work, and with a much less expenditure of fuel, than it did ten or twenty years ago There is now a large deficien y of food in New England. and her sterile land has now reached such prices that labor must be driven from it, if it can find as eligible and cheaper positions of employment elsewhere.

We have every element that enters cotton cloth, and at average prices far cheaper than elsewhere. Our iron ores for machinery, and coals for power, are equal in quality and greater in quantity than those of England or of Belgium, and at one-fifth their cost in labor. Cotton is within two days' journey —subsistence is found in the utmost profusion around us. Our great natural and ever open highways afford us the cheapest possible facilities of intercommunication. Our climate is most favorable to life and to labor. Our taxes are lighter, by far, than those of any other people. We have, and our position will always secure to us, the greatest possible security to persons and property. We have now a population superabundant for the supply of our agricultural wants; and now. when we are fully prepared to develope our mineral and manufacturing resources, and to enlarge those branches of industry that have been regarded as the chief sources of wealth, and the evidences of high civilization, the newly discovered mines of gold on the shores of the Pacific, are not only providing us with the means of manufacturing action, but are opening nearer channels of communication between ourselves and people of other countries, climates and products, and with whom we should naturally make exchanges.

Other reasons why we may expect a rapid growth are given in a recent petition to the executive and legislature of Indiana, for an appropriation for a geological survey of that State.

During the last ten years, the business of manufacturing has been very widely extended, and improvements in machinery in the use and economy of power, have somewhat changed the position of the elements which gave England and Belgium and New England their superiority. The changes in the channels of commerce which have already occurred and are now clearly foreseen, are also resulting in the change of position of the manufacturers who chiefly support and employ that commerce. The vast multiplication of scientific books and journals has resulted in advising manufacturers not only of the best machinery used in their particular departments, but of the relative advantages of different sites for operating that machinery.

The statistics of producing the material, of working up the material, and of moving the material and its product from the producer to the consumer. are now gathered from every source, combined with care and then rapidly spread through the workshops of the world.

The art of working in metals and in fibrous materials, was once a mystery, and they who possessed it cared but little for the cost of transportation, or the burthen of taxation, for they had a monopoly, and measured the value of their work by the ability and necessities of their customers. But now there are few

such mysteries. The inventor of a labor-saving machine is neither imprisoned nor bought. In the proportion of its efficiency is the extent of his travel and the number of his advertisements.

As a consequent of these changes, the manufacturers of the world and they who would put capital and labor in manufactures, are now eagerly looking abroad to ascertain where the natural advantages are the greatest for carrying on their respective operations; everything is taken into view; everything has its relative weight, value, and importance stamped upon it. The sum total of the various items fixes the locality.

There is another element now in operation, in continental Europe, and not the least potent in the manufacturing districts, which is swelling the tide of emigration to this country. In France, Germany, Prussia, Saxony, Silesia, and Switzerland, where there are many thousands of people and many millions of capital employed in supplying the markets of America; political revolutions have rendered investments in macinery unsafe, and have increased the burthens on the energies and success of the manufacturers. These people are now looking for more quiet homes, cheaper lands, and lighter taxes.

To these classes of manufacturers, the holders of our food, our minerals, and our fibrous staples should show points of refuge, safety, and profit. We, who desire to bring the consumers of what we have to sell to come near to us, have every interest in showing these consumers the goodness and the value of what we have to sell. We have land, coal, iron, and lead ores, the earths employed in the arts and mannfactures—the cotton, hemp, and wool, each and all far cheaper and of a quality equally good with what they obtain where they now are—but they do not know these facts, and they cannot be expected to credit the statements of individuals who have their own purposes to subserve. The State must furnish the official vouchers and endorsements.

The effect which the establishment of extensive manufactures in one part of the State would have upon the agricultural interests of the other sections of the State are obvious The counties of the State, now wholly agricultural, would soon diversify their pursuits. The eastern outcropping of the coal field extends one hundred and fifty miles from the Ohio, to the northwestern boundery of the State. Railroads will soon cross this margin at various points, and connect the mineral with the agricultural districts. These roads will place the coal on the eastern limits of the State at prices lower than the average rates of an equivalent coal in the manufacturing districts of Europe. The iron ore may pass through the furnace, and perhaps through the rolling mill, near its native bed, but it will then be taken where subsistence is the cheapest, and the last processes of its manufacture will require far more hands and capital than the first.

Within the last year this subject has engaged the serious attention of the Eastern Press, and the following extract from the New York Dry Goods Reporter, expresses the general opinion of that Press:

We are pleased to see such an interest awakened at the South and West, in regard to manufactures. From an inspection of the valley of the Mississippi last year, we became convinced that the day was not far distant when neither the Southern nor Western States would be dependent upon the East for the products of the loom. It is clear to our mind, that this portion of the United States is destined to be the battle ground on which the control of the non-producing markets of the world is to be decided. The inexhaustible beds of bituminous coal which run parallel with and contiguous to the great Father of Waters, will supply the *cheapest motive power in the world*, while they will have for a market, not only all the States that lie contiguous, but they are nearer to the markets of all Mexico. If the Atlantic and Pacific Railraad is ever made, it will debouche somewhere near New Orleans, and this region will, in this matter, again have the advantage of the rest of the world.—*D. G. R., Jan.* 20, 1849.

Many quotations, like the above, might be given. Indeed, the sagacious statesmen and manufacturers of the East seem to appreciate our advantages far more highly than we do.

The foreign demand for the coal of the Lower Ohio is forcibly set forth in the following letter of Mr. Maury, whose position and means of information entitle his opinions to great weight.

Extract from a recent letter from Lieut. Maury to R. Triplett, of Bon-Harbor, Ky.

"Go ask the railroads, canals, and the whole network of internal improvements that are stretching themselves out from the four quarters to reach the Ohio, and through it the great stream of the West: from North, South, East, and West, they will point you there, and with an eloquence, though mute, yet far more significant than words can ever do, they will tell of the inducements that the mining and manufacturing facilities there presented, hold out to the investment of capital.

"Ask the capitalists and statesmen of Pennsylvania and Maryland; of Virginia; the two Carolinas, Florida, and Alabamba; of Mississippi, Louisiana, Missouri, and the tier of Ohio States, why are they investing more than their one hundred million of dollars in works of internal improvement to and fro, and through the valley of that river? and they will tell you it is because of its immense resources in all the elements of wealth—its fertile soil—its thriving population—its water power—its coal measures—its hills of iron, and fine climate—all combined, have drawn either a railroad or canal almost from every State in the Union, towards that region, so attractive is it.

"The natural highway of down stream navigation from you to the Gulf, and thence with the Gulf stream to the long range of Atlantic States, was not, in the eyes of business men, sufficient; other market ways and commercial channels to and from your favored region of country were wanted, and we have actually seen sovereign States contending and striving with each other in opening these ways.

"The uew channels for business and commerce already under way or completed to the Ohio river, from the Lakes, the Atlantic and the Gulf, are monuments of the commercial power and greatness which slumber with you. * *

"New Mexico, Deseret, and all the embryo States between you and the Rocky Mountains, will be as dependent on your workshops for the next generation, as you for the last have been upon those of New and old England.

"The railroad to California, taking the Southern route, will open to you the markets of interior Arkansas and Northern Texas. Running along the frontiers of Mexico for hundreds of miles, it will give you a monopoly in trade with the three or four millions of Mexicans who will have nothing to give you in exchange for your merchandise but silver and gold, and the produce of their mines—the very articles that you most desire.

"Within the last year the workshops of New England have thrown into Mexico from the right bank of the Rio Grande, about four millions of merchandise, whereas, before the navigation of that river was opened, New England scarce sent as many thousands there.

"The California railroad will open to you a richer and better country *by far*, than that along the banks of the Rio Grande.

"Before the conquest of California, the inland trade with Santa Fe amounted to some three or four millions annually, despite drawbacks and the Mexican tariff. What will that amount to now, with increased population, increased facilities of communication and free trade?

"That of itself is a prize for which the Western States may well afford to enter the manufacturing list, that they may contend for it. * * *

"Then as for your coal mines, a new market of boundless extent is also just about to be opened for that article. The coal measures of the West may monopolize that market.

"The Pacific ocean from California to Chili is the smoothest sea in the world. It is admirably adapted for steam navigation, as is the Mississippi river itself; and yet, all the way along that coast, from the Columbia river to Cape Horn, there is not a single coal measure from which the steamers there can be supplied.

"The Pacific steamers have to have their coal sent to them all the way round

Cape Horn, at the cost for freight alone of some $20 or $25 the ton. Our mail steamers in the Pacific have been paying as high as $40 the ton for coal.

"The Panama railway will put an end to this, and bring that market to your very doors.

"The fleet of staamers already in the Pacific and preparing to go there, will require about 100,000 tons af coal this year. By the time the Panama railway is completed, and you get your coal mines fairly developed, the demand for coal there will be largely increased, reaching in a few years a million of tons annually. Panama is midway the coast and therefore in the very position for the coal deposite of that ocean. None of the mines that are washed by it can interfere with you, because from Borneo, Formosa, China, and Japan, which abound in coal, America is up stream or to windward.

"Having the coal on the banks of the river you will be enabled to deliver it in any quantities at Chagres cheaper than it can be brought from the mountains of Pennsylvania, and sent down by sea to the same place. To get that coal of Pensylvania to market, it has to pay tolls both to railroads and canals, which together with the expense of the inland freight nearly or quite equals the cost of mining.

"You have the broad Mississippi and beautiful Ohio without toll gates or weigh-locks at your free use, for everything you choose to place upon their bosoms for market.

"With these facilities you will be enabled to deliver in Chagres coal for the Pacific steamers at $4 or $5 per ton, perhaps less. For a dollar or two more the railroad will deliver it the other side on the shores of the Pacific, and thus the steamers there, instead of paying $30 or $40 for coal, will get it at $6 or $7, and that will tend greatly to increase the number of steamers there, and to swell the demands for the produce of your labor.

"You observe, therefore, how propitious are the times: these improvements to the Pacific are budding forth just about the time that your mines are ready to open, and when you are showing the first blossoms of your manufacturing powers, facilities and capacities. What a rich promise of early fruit do they not hold out to you.

"Commence now and drive ahead—for these markets will expand as fast as it will be possible for you to enlarge your capacity to supply them. Not overbold is the prophecy that in ten years from this time there will be annually delivered across the Isthmus for consumption in the Pacific, not less than one million of tons of coal from the West. This is only one item of the many among you, which are not known in your foreign commerce.

REPORTS OF GEOLOGISTS AND ENGINEERS IN REFERENCE TO THE MINERALS, EARTHS AND POSITION OF CANNELTON.

Louisville, Nov. 20, 1847.

To Prof. Silliman, New Haven, Ct.:

An accidental meeting with you, some years ago, among the lead mines of Missouri, hardly entitles me to claim a personal acquaintance with you, but to you whose life has been spent in the pursuit of useful knowledge, I am sure I need offer no apology for the request I am about to make, for I am persuaded it will give you pleasure to spread as widely as possible, a knowledge of those vast and valuable resources with which a bountiful Providence has blessed our country. Nor can I expect to communicate anything which may be entirely unknown to you; but to a numerous class of the readers of your Journal, the information I send may be, if not entirely new, of sufficient interest to engage their attention

I have just returned from an excursion to a part of the great coal field which lies between the Falls of the Ohio and the Mississippi river. That part of this magnificent coal basin to which my attention has just now been particularly directed, possesses, I think, unusual interest, not only to the geologist, but to the practical miner, and I now propose to present your readers a description of it, not only as a contribution to science, but in the hope that it may attract the at-

tention of some who are seeking new objects in which profitably to invest their capital. Generous as nature has been in giving us a genial climate and productive soil, with navigable rivers that traverse every portion of this immense valley, I doubt whether in our own, or in any other land, there can be found anything surpassing in richness and extent its mineral resources. My object now is, however, to invite attention to a single item in this great arcana of wealth, not doubting that, at some distant day, when the mineral capacities of this country shall be fully revealed, our present knowledge will be but as a grain of sand upon the sea shore, in comparison to that which time and science and the employment of labor and capital will unfold.

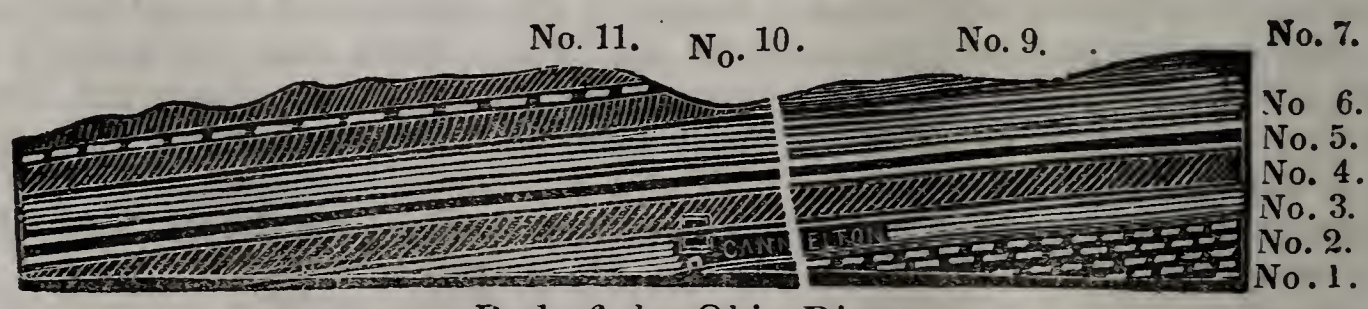
The whole coal field, of which the point I refer to forms a part, occupies a portion of five States, extending from near Bowling Green, Kentucky, to the mouth of Rock river, Illinois, and from St. Louis, Missouri, to near Bloomington, Iowa, being about five hundred miles in length and about two hundred wide, containing about seventy thousand square miles, and embracing an area greater than the whole State of Illinois. It is not very likely, however, that any considerable part of this vast body of coal will be of any practical value to the present generation, but there it will lie, where a wise Providence has placed it, for the use of those who come after us; a fund of future wealth which no man at this day can venture to estimate. To the practical miner of the present time, the important enquiry is, where, in this extended field, is the greatest combination of favorable circumstances for the employment of labor and capital in mining coal?

The discoveries in science and the improvement in machinery made during the last ten or twelve years, by which steam is used for ocean as well as lake and river navigation, and by which, on the score of economy as well as convenience, t is superceding water as a moving power in our manufactories, renders this question of the supply of coal, one of increasing and great import. Without coal, the stately ocean steamer which now heeds "nor winds nor waves," would lie powerless and lifeless upon the sea, and equally indispensable is it, as the agent which gives motion to the machinery of our great cotton and rolling mills, to say nothing of its increased use for fuel and light in our large towns and cities.

Feeling that this subject is every day acquiring more importance, I have spent much time in the study of this great coal field, and I shall confine the rest of my remarks to that portion of it, which, in my opinion, offers superior advantages in respect not only to the quality of the coal, but to the ease with which it can be obtained, and the facility and cheapness with which it can be furnished for the purposes to which I have referred.

The point to which I allude is *Cannelton* and its vicinity, situated on the north bank of the Ohio river, in Perry county, *Indiana*. The undoubted health, as well as the beauty of this location—the abundance and excellent quality of the coal—its commanding positionon the lower Ohioi where navigation is neither interrupted by ice and low water, renders it a point of uncommon interest. The business of mining coal is becoming important, and whether viewed as a depot for the supply of fuel for navigation or domestic purposes, or as a future manufacturing city, of which, I trust, there will be more than one within the circle of this great coal basin, it is looked upon by men of forecast as a place of much future consequence.

In order to give a definite idea of the exact position of the coal and of the method of mining it, I give the following drawing, embracing a distance of five miles along the Ohio river.



Bed of the Ohio River.

It will be seen by the above drawing that the strata all dip or incline to the west, the amount of which, at this place, is about fifty feet to the mile; conse-

quently, the main bed of coal, which is represented on the right, as two hundred feet above the river level, is nearly down to its bed on the left. The following is a description of the strata represented in the section:

No. 1. Is a bed of green argillaceous shale, or, perhaps, it might as well be termed slaty clay, containing occasional thin layers of argillaceous iron ore. It is destitute of fossils. Its thickness at this place is about eighty feet, as seen higher up the river. When acted on by air and moisture, it becomes very soft, and thereby looses its power of sustaining the super-incumbent rocks. It is this which causes the exceeding steepness of the hill in the upper part of this section and for several miles above.

No. 2. Is limestone about twenty feet thick, and filled with small organic remains, the most interesting of which I noticed were terebratular.

No. 3. Is a true conglomerate of mill-stone grit, consisting almost entirely of quartz gravel and coarse sand, without any visible cement. It is an excellent material for furnace hearths and fire-stones; and likewise for mill-stones, where the grains adhere sufficiently together. Doubtless it would be found to be depository of salt water where the dip has carried it sufficiently below the fresh water level, as it is evident that all the valuable brine found in the western States, is derived from rocks of this sort. It has a double stratification, as represented in the drawing, showing conclusively, that there were strong currents in the ocean where it was deposited The same kind of stratification is seen in great abundance along the Mississippi river at low water and sometimes on the Ohio. The sand-bars which occasion so much trouble to boatmen, are generally produced in this way, being a kind of terrace formed by the water upon which the sand is rolled by the current, till it comes to the edge where it rolls down by its own weight into deeper water and stops. In this way the bars are continually extending themselves downwards, unless arrested or cut off by some counter-currents. Its thickness is about thirty-six feet.

No. 3. Is a fine grained sand-stone of remarkable uniformity of texture, and in the size of its particles. This shows that it was deposited in a quiet ocean, whose waters flowed gently but steadily onward. It has a single stratification which causes it to split readily into square bloocks.

When first quarried it is very soft and easily worked, but it soon hardens on exposure to the weather, which renders it an excellent and valuable building material. It is extensively quarried and boated down the river for the government works at Memphis. The thickness of this bed is about thirty feet. There is generally a thin bed of shale between this and the conglomerate, but it never exceeds a very few feet, and is sometimes altogether wanting.*

No. 5. Lies immediately upon No. 4, without the intervention of any shale, and is almost destitute of stratification, especially in its central position. It consists of a confused mixture of sand, shaly matter and iron ore. It abounds in organic remains, chiefly calamites, which shews its proximity to coal. It is about fifty feet thick.

No. 6. Is argillaceous shale, including one of the most valuable beds of coal found anywhere in our country. The whole varies in thickness from about twenty to thirty feet. The upper and lower portions are generally light colored but grow darker towards the centre, until it becomes perfectly black in the middle. On the darkest portions of the shale lies the bed of coal, the thickness of which varies from three to four feet, but sometimes it increases to nearly five feet. But it is not its thickness which particularly recommends it to notice, it is its excellent quality, the freedom of the mines from water and its nearness to the river. It is estimated that a cubic foot of coal in the mine is equivalent to one bushel in weight. There are 43,560 square feet in an acre; consequently there will be as many times that number of bushels as there are feet in thickness in the bed. It leaves no cinder in the grate, and leaves only 2.11 per cent. of white ashes. It resembles in appearance, and burns like the cannel coal, and it has been so call-

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*Dr. D. Dale Owen is of opinion that this is the same stone as that from an analogous formation in Scotland, and used in the construction of Melrose Abbey, "which is 700 years old, and whose cornices are still as sharp and as perfect as if they had been carved only a few years ago." S.

ed, but it is considered by the best judges as belonging to the bituminous variety.

No. 7. Is sand-stone, about eighty feet thick. The lower half of it has a double stratification in the highest degree, showing that the state of the water which deposited it was exceedingly agitated. It also possesses numerous contorted veins of iron ore, which being much more durable than the adjacent sand-stone cause it to present a very jagged appearance where it is exposed to the weather. This circumstance is very characteristic, and furnishes an easy guide to the position of the coal in the hills. The upper part is regularly stratified, but will not bear exposure to the weather. I have not observed any organic remains in any part of it.

Above this sand-stone lies another bed of coal, but too thin in this vicinity to admit of being worked, though it obtains a workable thickness in other places.

No. 10. Is a bed of very impure limestone, but it is probably not continuous, as I have not detected it elsewhere.

No 11, Is sandstone, and tops out the hill in the lower part of the section, but it possesses nothing of any particular interest. It is seen only on the tops of the highest points.

Cannelton is about one hundred and twenty miles below Louisville, by water, and about half that distance on a straight line. The section above described, is at the commencement of the great coal field, and the bed represented is the first, or, geologically speaking, the lowest in the series, which consists of four workable beds in all. None of them, however, possess the advantages that are found at Cannelton, either in respect to the quality of the coal, the ease and consequently the cheapness with which it can be worked, or in proximity to the river.

Respectfully yours,

B. LAWRENCE, *Geologist.*

QUANTITY, QUALITY, AND CHARACTERISTICS OF THE CANNELTON COAL.

The section of the coal seam, at Cannelton, cut by the Ohio, and above low water mark, is somewhat over four miles in width, and extends northwardly at about the same width and elevation, and along the outer edge of the basin; as it increases in thickness where it is cut by the Eel, White, and Wabash rivers, it is believed that it will prove from six to ten feet thick within a few miles of the Ohio; where now worked, each acre yields about 120,000 bushels; a section of four by ten miles would yield over three billions of bushels—a supply for a city of 100,000 manufactures of cotton, wool, and iron, for six or seven hundred years; and besides, when the price of the coal in the hills advances two cents a bushel, the section under the water level will be worked so as to give a front of eight or ten miles. There can be no doubt, then, as to a permanent supply.

As to the quality and characteristics of the coal reference is made to the following reports:

Louisville Gas Works, October 28, 1841.

"Carbonized 2700 lbs. of Hawesville (the Cannelton coal opposite is more free of slate and sulphur) which produced 9940 cubic feet of gas, 54 bushels of coke weighing 1413 lbs., and about 30 gallons of tar. The gas produced was remarkably free from sulphur.

"J. JEFFRIES, Superintendent."

ABRIDGEMENT of the Report of JOHN H. BLAKE, Esq., *Superintendent of the Boston Gas Works, of experiments and analysis, made by him on the* INDIANA CANNELTON COAL, *from the mine of* JAMES BOYD, *Perry county, Indiana.*

"James Boyd, Esq.: With this I send an account of the results obtained from my examination of the sample of coal brought by you from the mine at Cannelton, Indiana, by which you will perceive that *the middle portion of the vein** is as valuable as any description of coal which is brought to this market. It is particularly to be recommended for the manufacture of illuminating gas, and for burning in parlor grates."

"In the quantity of gas which it can be made to yield, and in the proportion of bicarbonated hydrogen afforded, it will be found to be fully equal to the best coal which is brought here from Newcastle, England; while the *small* proportion of sulphate of iron, with which it is contaminated, renders it in this respect *much more valuable.*"

"It differs, in *structure*, from English cannel coal, which, in chemical composition, it closely resembles."

"So far as my experiments enable me to judge, it will afford as large a quantity of illuminating gas, as the Cannel coal of Lancashire, and in the parlor grate, kindles nearly as readily, and produces an equally agreeable fire. The small quantity of ashes which it leaves in the grate, renders it for the latter use, particularly valuable."

"The specific gravity of two portions selected from the middle part of the vein—the one selected as being the lightest—and the other the most dense part, was found to be 1,230 and 1,244, the mean of which, 1,237, is probably the average weight, compared with pure water of the mass. A solid cubic yard, therefore, would weigh 2,087 lbs."

"100 grains of this coal, after being thoroughly dried, afforded

Charcoal	61.93
Volatile combustible matter	35.96
Silicia, alumina, sulphate of iron and oxide of iron	2.11
	100.00

"Of the earthy matter above mentioned, 0.322 parts consists of iron pyrites, which would be equal to less than six and a half ponnds in a ton of coal.

"A quantity of this coal, subjected to destructive distillation, at a bright heat, in a close iron retort, afforded *four and a quarter cubic feet* of illuminating gas for each pound of coal, which is equivalent to 11,475 cubic feet per chaldron, assuming the weight of the chaldron to be 2,700 lbs. The specific gravity of the gas was .523."

"The coke produced in this experiment was found to be lighter, to kindle more readily, and to burn more freely than that obtained from most of the varieties of coal."

"By comparing the results obtained in the above mentioned analysis, with those

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*NOTE. The middle is the only portion of the vein that is mined as merchantable. The other parts, the extreme top and bottom are never brought out of the mine. Yet Mr. Blake, having the entire strata submitted to him, (a column of some 1500 lbs.) analyzed all the parts and finds that portion (the top and bottom) which has hitherto been rejected, to be very good coal, better than the Virginia Midlothian.

obtained from coal from other localities, as shown in the annexed table, the comparative value of the Indiana Cannelton coal will be readily seen."

In 100 parts of dry coal.	Charcoal.	Volatile combustible matter.	Earthy matter.	Specific gravity.
Indiana Cannelton coal	61.93	35.96	2.11	1.237
English Lancashire Cannel coal	62.22	35.28	2.50	
English Derbyshire Cannel coal	48.36	47.01	4.63	
English Newcastle coal	64 28	32.52	3.20	
Scotch Cannel coal	39.43	56.57	4.	
Virginia Midlothian	60.03	30.94	8.95	1.293
Nova Scotia Pictou	54.20	30.80	15.	

Signed, JOHN H. BLAKE.

Boston, October 8, 1843.

Under an Act of Congress of 1841, Prof. Walter R. Johnson was employed by the Secretary of the Navy to institute a series of experiments to test the relative values of different coals; these were made at the Washington navy yard with great care and at great expense—every known test was applied to forty-four kinds, including the best of Nova Scotia, Scotland and England—the results were published in a large volume in 1843-4—U. S. Senate doc. 386.

Under a mistaken impression of the precise purposes for which the coal was desired by the government, an entire section of the Cannelton seam (including the top and bottom shale and an intermediate band of several inches thick, containing a mixture of slate, sulphur, dirt and iron pyrites, and called "dunt" by the miners, and which are thrown aside in the mine) was forwarded to the Department,—notwithstanding these impurities, the coal is placed in the tables—

No. 1. In the order of rapidity of combustion.
" 10. In the order of completeness of combustion.
" 2. In the order of freedom from waste in burning.
" 10. In the order of tendency to form clinker.
" 17. In the order of maximum rapidity of evaporation.

Pittsburg coal (of which selected samples were sent by Messrs. Hepp & Co. of New Orleans,) ranks lower in each of these particulars except the fourth, and, as every engineer who has used both knows, the Cannelton is decidedly superior in this respect to any other known in this country, except the pure cannel found on the Kenhawa and Sandy rivers.

Compared with the best Liverpool coal, the tables show that the Cannelton coal is heavier, has less earthy matter, less tendency to form clinker and has near eight per cent. more of fixed carbon.

The relative value of the three kinds is perhaps more fairly given in the "table of cubic feet of water evaporated per hour during steady action," the quantity of each being the same.

Liverpool	13.43
Pittsburg	10.56
Cannelton	15.05

The only coals that exceeded Cannelton in this table were:

Coke of Neff's Cumberland coal	16.50
Atkinson & Templeman's and Pictou on the eastern slope	16.47

In his preface, Prof. Johnson remarks:

"The question of the value of coals for the purpose of generating steam is, of course, mainly dependent on their heating power; that is, on the weight of coal, burned under a given evaporative vessel, can convert into steam, while undergoing combustion."

In the tests applied to ascertain its efficiency for making chains it ranks low in the tables; at the mine the smith selects particular layers in the seam, which are easily distinguished and separated, as in England at Sheffield; these are found to be as well adapted for the purposes of the forge as any other bituminous coal.

It is to be remarked that this coal is just now coming largely into use, and that its working peculiarities are not yet understood; our grates, stoves and furnaces are all constructed for the burning of Pittsburg coal, and most of the engineers on our western boats have yet to learn that each requires a different management—the one burns with more rapidity and evolves more heat, and, of course, a less quantity is required in the same time. Experience, however, will soon give all the practical information on the subject that we require.

Sixteen years ago, scarcely a bushel of coal was used on steamboats, and engineers were very positive in their belief that it never could be used to advantage in steamboat furnaces; now from ten to twelve bushels of bituminous coal is found to make as much steam as a cord of the best wood,—on the Ohio the one costs from 50 cents to $1 60 and the other about $2 25; the cost of the latter is constantly increasing, and every improvement in the construction of boilers and furnaces is likely to increase the difference in the effectiveness of the two kinds of fuel.

The following extracts are from pages 538 and 598 of Prof. Johnson's Report.

"In an office grate, a lump" (of Cannelton coal) "15 inches in diameter was laid on a mass of ignited coke. It immediately took fire and in three minutes was giving off a brilliant flame. From its flaky texture, it speedily disintegrated into flat masses, burning with little intumescence and scarcely any tendency to agglutination. This property allows a free passage to the air, favors rapid combustion, and causes the exhibition of an exceedingly brilliant light. When the white flame had subsided, it was followed by one of a bright blue or purplish tint, (cyanogen?) which having subsided, left a light, porous, glowing coke, falling readily into small fragments, which preserve, to some extent, the original lamellated appearance of the coal. On the grate, under the steam boiler, it was observed to ignite readily; and *it took only half an hour to bring the*

boiler into steady actian from the time the wood was withdrawn and the charging with coal had commenced. No serious inconvenience was felt from the passage of fragments through thc grate. ITS PROMPT AND RAPID ACTION SEEMS TO ADAPT IT, IN A REMARKABLE MANNER, TO THE PURPOSES OF WESTERN STEAMBOATS.

"Experiments appears to demonstrate that for the purposes of *rapid* evaporation, and for the production of illuminating gas, the coal of Indiana, (Cannelton) though neither very heavy nor very durable, is inferior to none of the highly bituminous class to which it belongs; *since in heating power, and in freedom from impurity, it surpasses the splint and cannel coal of Scotland.*"

—

Extracts from Dr. Jackson's Analysis of the Coal.

"BOSTON, July 30th, 1836.

"*To the Agent of the American Cannel Coal Company:*

"DEAR SIR: I have made a chemical analysis of the Indiana coal which you sent me, the result of which you have below:

"The coal is of a brilliant shining black color, and breaks with a conchoidal fracture. Its structure is stratified, and between the layers of coal are found carbonized remains of vegetable fibres. It gives a black streak when rubbed on wedgewood ware, and its powder is black. The coal does not soil the fingers when rubbed upon it, and is remarkably clean and free from dust. No traces of pyrites were discoverable in the coal.

Composition of the coal in 100 grains,		
Carbon	48.4	
Bitumen	48.8	
Oxide of iron, alumni and silicia	=2.8	Ashes.
	100.0	

"From the above analysis it appears, that your coal is of a highly bituminous nature, resembling more nearly the cannel coal of England than any other variety.

"It is highly valuable for domestic use and is admirably adapted to produce coal gas, which it will yield in great abundance; the bitumen being of a nature resembling petroleum mixed with a little asphaltum.

"It is evident that the coal, when burned in the grate, will give a large yellow flame, and will leave a small quantity of red ashes, consisting of peroxide of iron and a little clay.

"Owing to the abundance of bitumen in this coal, it is admirably suited for locomotive steam engines, and for steamboats, where a rapid and powerful flame is required.

"I have no doubt the Indiana cannel coal, such as you sent me, will command as high a price in the market as the best cannel coal of England.

"C. T. JACKSON, M. D., Chemist."

—

BOSTON, April 4th, 1850.

WM RICHARDSON, Esq.

Respected Sir:—I have made a geological investigation of the coal lands belonging to the American Cannel Coal Company, of Cannelton, Indiana, and found them lying upon the southeastern edge of the Indiana and Illinois coal field embracing the saliferous rocks, beds of pure cannel coal, iron ore, and a great variety of beds of sandstone; the whole group composing the lower series of the western coal formation.

Here are four distinct beds of coal, one of which has been mined, successfully, for some years, and is mined at present to a great extent by James Boyd, Esq., and known by the name of "Boyd and Mason vein." It is 3 feet 9 inches in thickness, and has a number of openings into it upon the Company's

lands in various directions back in the hills, and in many places exceeds 4 feet in thickness.

The American Cannel Coal Company own in fee simple about 7000 acres of good arable land, and well timbered; and, of this amount, after deducting a proper per centage for the area of ravines, I may fairly state that the said Company have nearly 4000 acres of cannel coal land. The coal, lying in nearly a horizontal position, affords the facility for making a nice calculation as to the probable amount of coal contained within these lands. The American Cannel Coal Company, according to my calculation, have in one single bed upwards of 400,000,000 bushels of cannel coal, and about 150,000,000 bushels of common bituminous coal in the smaller beds, making in all 550,000,000 bushels of coal.

The quality of the coal of Cannelton is undoubted. During my stay at Cannelton I observed its combustion in the parlor grates, and under the steam mill boilers, and saw that it made a beautiful fire, and for cleanliness was superior to any coal I had ever seen of the bituminous character, and for readiness of ignition and yet economical use, surpasses all of the coals of the bituminous character of the West. By reference to the able and impartial Report of Professor Walter R. Johnson upon American Coals, one may see that the cannel coal of Cannelton, Indiana, rates first in the list of experiments as regards ignition, generating steam, and for domestic purposes.

It mines out in beautiful blocks of a merchantable character, and can be stowed to great advantage. I therefore recommend it to steamers sailing from, or touching the port of New Orleans. The steamboats upon the Ohio river consume nearly half a million of bushels per annum of this valuable article of fuel, and it is obtained at Cannelton of James Boyd, Esq.

John R. Blake, Esq., of Boston. analyzed the coal of Cannelton, Indiana. and experimented upon its combustion, and found it to surpass in quality all American cannel coals which had as yet been found, also to he superior to the Scotch and Derbyshire cannel coals, but finds it equal to the Lancashire cannel coal of Great Britain.

Immediately under this main bed of coal is a good bed of fine clay, varying in thickness from 5 to 10 feet, suitable for pottery and fine brick, and which is now beginning to be extrensively used. High up in the hills and back from the river are several smaller beds of coal, but not developed.

The sandstones of the hills are an excellent quality of building stone, composed of a great variety of brown. grey, and reddish brown sandstones. mostly free from mica, except some of the grey beds which contain it in very fine particles. The layers are easily quarried, and there are some magnificent quarries in the Cannelton hill. that have been opened to obtain the stone for the erection of the Cannelton Cotton Mill.

The coal crops out upon the lands of the American Cannel Coal Company, and has a general inclination to the N. W., with a series of swells in the line of direction of its plane (strike), keeping up the coal for some distance down the river, extending through lands of Stephen M. Allen, Esq., of Boston, and into lands belonging to Judge Huntington. The Ohio River passing through the coal formation a few degrees north of northwest. Such physical features present the idea at once, to every practical collier, that these mines are upon the best bank of the river as regards the facility for mining coal, quarrying stone, and the obtaining of timber from the hills.

Timber:—Oak, walnut, maple, cherry, beech, poplar locust, ash, hickory, sycamore, pawpaw, and grape vines in wild abundance.

The soil of the country is of an excellent quality and finely divided, characteristic of the soil of the West, and extends up to the top of the hills. In many places there is a more highly mixed soil, composed of the older soil and the disintegrated particles of a lower member of the new red sandstone, creating spots of land in the back hills more suitable for wheat and oats than the general soil of the county. The deposites of iron ore add a per centum of iron to the soil, enriching it for many purposes of agriculture. In fact almost any soil may be found here to suit the farmer. There are also spots particularly adapted for the culture of the grape, and the climate is peculiarly so.

I was particularly struck with the fine sites for cotton and woolen factories, iron rolling mills, glass factories, machine shops, potteries, &c., by the side of navigation in the central West.

That such mineral resources, productive soil, salubrious climate, variety of timber, all in proximity to the cotton growing district of the South, should remain untouched so long, and that now, within a year, there has been a substantial stone cotton factory of 10,000 spindles, erected at Cannelton and almost in operation, proves conclusively that the mind of man is at work, seeking for cheapness of power, cheapness of living, extensive market, and salubriousness of climate. Cannelton must ere long prove to be an oasis in the great desert of manufacturing enterprize of the West.

Respectfully submitted,
THO. S. RIDGWAY, Jr., Geologist.

Extracts of a letter from Prof. F. Hall, L. L. D.

In 1843, Dr. F. Hall, an eminent geologist and mineralogist, and then Professor in Columbia College, visited Cannelton, and in a letter to F. Markoe, Sec. of Nat. Institute, published in Nat. Intelligencer July 22, 1843, gives the following statements and opinions.

"The material immediately above the Cannelton coal is a slightly bituminous shale, of a blue color, that varies from ten to eighteen feet in thickness. The coal in the highest part of the vein, for an inch or two, contains less bitumen than the other part of the coal and decrepitates when burning: it bears a slight resemblance to cannel coal, but is too soft and friable to be turned in a lathe or to bear a fine polish. There is a thin stratum about a foot from the upper surface of the vein which, in the language of the miners, is called "dunt" and which is coal embracing allum-earth and sulphuret of iron, and which crumbles to pieces when exposed to the action of the air and moisture.* Two or three inches of the vein at the bottom are bituminous shale, which, however, burns nearly as well as the coal above it and lasts much longer. The coal forming the remainder of the mass is of the finest quality. It comes out in medium blocks, often a foot or eighteen inches in diameter, and almost every block betrays its vegetable origin.

There is one peculiarity connected with this coal field which to me is very striking, viz: the horizontality of the coal vein, and I note it as a singular fact that the vein has *no* connection with limestone either *above* or *below*. The quantity of this combustible which an old world has here treasured up for the use of man is immensely large.

It is not uncommon, sir, as you are well aware, either in England or in the United States, to find in the immediate neighborhood of large coal deposites an ample quantity of another, and in itself the most *precious* of all the material substances, viz: iron ore or iron stone. My examinations have led me to the conclusion that *the iron existing here is no less abundant than the coal.* The ore occurs in detached irregular masses, among sandstone rocks, over almost the entire surface of the hills, showing in many places what I regard as violent igneous action. It occurs also in veins or beds varying from two to five feet in thickness. There have already three of these been opened—one above and two below the coal vein and running, it is supposed, parallel with it.

The ore is of different kinds, but principally the argilaceous oxide exhibiting a great diversity of mitative forms. I cannot determine with accuracy its richness, because I have not with me the means of analyzing it. Being acquainted

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* As the coal recedes from the river this stratum of "dunt" diminishes in thickness and no traces of it are seen in a vein opened about a mile from the river.

ber of the large establishments in Europe and New England, I can, I think, form a tolerable correct estimate of the metal which a specimen contains from its external characters. There is very little even of the surface ore which will not yield from 25 to 35 per cent of iron. Most of that which comes from a vein or bed opened to any considerable depth will, I am persuaded, afford from 45 to 60 per cent. The iron ores of South Wales yield, on the average, says Mr. Forster, 26 per cent, and those of Northumberland 30.

Why, it may be asked, is this ore, so rich and abundant, suffered to lie here undisturbed? Why do the people of the West, for the purpose of creating rail roads and carrying on other internal improvements, consent to pay to transatlantic strangers so enormous a tax for the very article which lies idle under their own soil? *The day is not distant when the iron ore of this region will be accounted no less valuable than its coal fields.*

The sandstone in this quarter is of different qualities—some of it is an excellent building stone—some, which is white and of a fine grain, is employed for mantle-pieces, &c. Some of it is novaculate or white slate, and is used extensively for whetstones. There is a spring a few miles from this place which yields petrolium, but I do not know to what amount. I have visited a spring about a mile from the village which is strongly impregnated with sulphuretted hydrogen."

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No explorations or experiments have been made on a scale sufficiently extensive to test the quantity or quality of the iron ore to which Dr. Hall refers. Dr. Owen refers, in his geological report, to the "Iron Hill" back of Troy and Cannelton, as affording some prospect of good ore by digging. The best iron ore of the valley, however, seems to lie in a lower strata of the coal series. On the Cumberland River the rich iron ore approaches within 10 or 15 miles of the margin of the coal field. Back of Elizabethtown, in Illinois, the distance is still less, while at Bloomfield the coal and iron are almost contiguous. Near Terre Haute the best of iron ore is found entirely within the coal basin. Without more extended and accurate surveys and analyses, it is impossible to determine, with any accuracy, the limits of our available iron deposites. Of this, however we are certain, that there is no reason why our coal should not arrest the pig iron of Missouri, Tennessee and Western Kentucky on its transit toward the coal of the upper Ohio.

CANNELTON, May 16, 1850.

Hamilton Smith, Esq.:

Dear Sir—You have propounded to me the following questions in relation to my coal mining operations at this place:

1st. "What is the average number of bushels produced by a good miner in ten hours—that is, dug and placed in the coal car?"

2d. "What the expense for 1000 bushels per day of bringing the coal 500 yards to the mouth of the mine?"

3d. "What accidents have occurred in and about your mines since you commenced operations. say seven years?"

4th. "What is the general health of your miners? What is your opinion of the healthfulness of the employment?" Is the labor of the miner more irksome than that of the agriculturist?"

To these please permit me to give a general answer. You alreadyknow the price I pay the miners is two cents per bushel for digging and piling up into the cars. To the second question I cannot give a precise answer, but from the following you can probably collect all you want. For the inside hauling in

with the quality of the iron ores which are advantageously worked at a num- the mine, I keep seven small mules, working generally five at a time, keeping two spare ones. These with five boys to drive, will bring to the mouth of the mine sixteen hundred bushels per day—for such a days work, the wages of the boys average 75 cents each. To keep drains and roads in good order, and perform other work inside apart from the mere digging, requires four or five men at an average wages of $1,25 per day. Foreman's wages $2,00 per day. Wear and tear of cars, inside railroad, &c. $1,50 per day.

The miners and their families are as healthy a class of people as any other amongst us. Both men and boys are attached to their business. Even the mules seem fond of it, and thrive well at it. For seven years, the whole time of my experience, there has been no accident in or about my mines, by which either man or boy has been killed or maimed, or in any way seriously injured.

The habit of my miners is to go to work very early in the morning—often before daylight, but always breakfasting before they go out. They dine early (dinner being always sent into the mine) and generally quit their days work about the middle of the afternoon, unless work is unusually pressing. The average time of the men for a days work is eleven hours, (including dinner time,) and for the boys and mules nine hours.

Comparing the miner's labor with that of the farmer, I would say the former has the greater points of attachment, because it is seldom that I notice a miner becoming a farmer, but frequently I find laborers and farmers desirous of becoming miners.

Very respectfully, Yours,

JAMES BOYD.

One of the important advantages possessed by Cannelton is its facilities for receiving and shipping freights by steamboats that stop there for coal. The following remarks of the Editor of the Louisville Courier, and the letter of Prof. Johnson conclusively show that these facilities wil be greatly enlarged.

FUEL FOR STEAMBOATS.

We publish to-day a valuable letter from Professor Walter N. Johnson, on the subject of coal fuel for steamboats. Professor Johnson was employed by Secretary Upshur, to make a series of experiments with the various coals of the United States, for the purpose of ascertaining the most appropriate article for use in the Government vessels. the report of Professor Johnson is one of the ablest scientific papers we know of, and it conclusivsly establishes his reputation as a man of extensive attainments, and an experimenter of the highest ability. The country is deeply indebted to Secretary Upshur, not only for the investigation he instituted, but for the aid and encouragement he gave Professor Johnson throughout the examination. We have Professor Johnson's report, and appreciate it as one of the best documents ever printed by Congress.

The remarks of Professor Johnson on coal as a fuel for steamboats will arrest attention, and they should set some of our steamboat men to studying out results. The country is full of produce far beyond the wants at home, and in order to seek a market, even the present low rates of freights must be lowered. In order to accomplish this, a system of greater economy in working the boats must be introduced, and the item of fuel is the most important one to commence with. If $30 worth of coal fuel will answer in place of $100 worth of wood fuel, a fine opening for economy is at once made.

Boats can be worked from Pittsburg to St. Louis with coal. From Pittsburgh to Louisville there is no difficulty—below this point, at Cannelton, 120 miles from Louisville, at Bon Harbor 150 miles below, and at Trade Water, 290 miles, coal can be obtained in abundance, and can be placed at the mouth of the Ohio from these points. Then there is coal of an excellent quality 12 or 14 miles back of the Grand Tower between the mouth of the Ohio and St.

Louis. A depot is soon to be made at the Grand Tower, it is said, by a Boston company. That boats which use coal, can run at a great saving is certain, and all that is necessary to make a supply for them is to commence the use of the article. The use of wood is becoming a serious expense to steamboats, and some means must be devised for economising in this important article of consumption. The letter of Professor Johnson is to the point, and we hope it will receive the attention of steamboat owners and captains.

Louisville Courier.

WASHINGTON, June 20, 1848.

Hamilton Smith, Esq.:

Dear Sir—I have never entertained a doubt that sooner or later coal is destined to supersede wood as fuel for steamboats. It is now ten years since wood was almost the only fuel used on all the finest boats, on the Eastern waters especially, those on the Long Island Sound, the Hudson, the Delaware, and the less important streams. Now scarcely any other than anthracite is used on those waters, and with such advantage that the rates of freights and passage are essentially reduced, while the profits of running are such as to induce the building of larger and larger vessels—all with a view to that species of fuel.

As to the question of the relative value of coal, compared with dry beach, ash and cotton wood, I am not aware that any direct experiments on the latter kinds of woods have as yet furnished the data for computing that relation. You may have observed that, in my report on coals, I have stated that the subject is yet unexhausted, and particularly that the coals of the West and Southwest were but very imperfectly represented in the series of samples sent for trial in 1843. Mr. Bull, who made experiments on the woods some twenty-five years ago, also experimented on certain coals, and obtained comparative results between weights of coal and cords of wood. But the western coals, those of Illiuois, Indiana and Kentucky, were not, I think, then brought into notice, and I am under the impression that cotton wood was not among the kinds submitted to trial by him. One object I had in view in requesting the Government to continue the experiments on coal was to perform at the West a second series of trials on the coals and woods found on the Western lakes and rivers. From all that I do know of the Western coals, and from all that I have learned from others of the wood of the Western country, I do not entertain a doubt as to the great economy of using coal wherever it can be had at a moderate price.

It is very certain that with prices such as have hitherto ruled on the Ohio and its branches, one could hardly suppose any other fuel than coal would be used, if the trips were confined to the coal region, or to a moderate distance beyond it.

The grates for using coal will in general be of less depth than those for the use of wood; the bars will be from $\frac{1}{2}$ to $\frac{3}{4}$ of an inch apart. But for different coals different dimensions of grate will be required. I suppose one difficulty experienced on the Western boats will arise from the attempt to burn too much coal at a time on the bars, by which means the iron will become overheated and fused, and if the clinker be also heated to the fusing point, the sulphur will attack the iron and run into compact masses with it, preventing the clearing of the fire. A thin stratum of coal on a grate raised to within a few inches of the bottom of the boiler will be probably found the most advantageous mode both for the economy of grate bars and for that of fuel. If the boilers do not make steam as rapidly as with wood, the obvious expedient is not to increase the depth of the stratum of coal, but to enlarge the area of the grate. Very respectfully, your obedient servant,

WALTER R. JOHNSON.

It has been demonstrated in the Louisville papers that, by system and the use of proper boats and machinery, the Cannelton coal can be delivered in that city at a cost of not over 6½ cents per bushel, and at a remunrative price of say 7½ cents per bushel, and that, neither by the upper Ohio and its tributaries, nor by railroad can the cities at the Falls of the Ohio be supplied with coal at that low rate. As soon as the demand is sufficiently large to justify the construction of the expensive instruments required, it will result in the organization of a line of freight boats between Cannelton and Louisville, and the large increase of a mining population at the former place and the still further increase of its facilities of receiving and shipping freights.

The value and superior qualities of the Cannelton stone quarries are indicated

1. By their convenience and extent, say five miles along the river bank, at the upper part of the property of the company, the cliffs are from 150 to 250 feet high, and approach within 200 yards of the river bank. Farther down, these cliffs recede from the river and lie immediately back of the town. The stone to build the mill and the coal to move its machinery can be brought on the same railroad.

2. By the durability of the material. This is shown by the growth of the mosses on the face of the stone, by its sharp edges and by the absence of disintegrated particles at the foot of the cliffs. The geological position of the stone also proves its durability.

3. By the facility with which it can be worked. It can be taken from its place in blocks of any convenient size: it splits in straight lines and is dressed by sharp and pointed tools at less than half the cost of dressing limestone or granite. It is thus remarkably adapted for the elaborate styles of architecture. In the opinion of those who have examined the subject, all the factories, public buildings and substantial private edifices will be made of this material in preference to brick at a cost of $5 per m. This will give the place an unique and beautiful appearance.

The following letters show the character of the stone under the tests of the hammer and chisel.

From Mr. Eastin, formerly Chief Engineer of the Public Works in Kentucky.

HENDERSON, NOV. 1, 1849.

In 1838 I opened the Cannelton stone quarries and with the stone taken therefrom, built the Lock No. 1, on Green river. This stone works well, is durable, and is not effected by any kind of weather, but on exposure becomes harder than it was in the quarry. I can safely say that it is the most substantial building material I have seen west of the Alleghany Mountains.

H. G. EASTIN,
Civil Engineer.

From Mr. A. McGregor, the Building Engineer of the Cannelton Cotton Mill.

CANNELTON, May 15, 1850.

For durability and cheapness the Cannelton quarries afford the best building stone I have seen west of the mountains, and it will stand the test of comparison with that of any quarries in New England. The best sandstone used in New York is from Connecticut and this is the very same as the brown stone used in building our mill.

The stone used in the erection of Trinity Church, New York, is from the Little Falls, N. J., and before the workmen could obtain sufficient perfect blocks they probably rejected three-fourths of the quarried stone, which is full of air bubbles, or holes, from the size of a twenty-five cent piece to that of a small pea; these are filled with loose and dry sand, so that, in droving or dressing, the surface will present a ragged appearance. The stone from the other N. J. quarries is far behind this in quality. I regard this as equal in durability to the famous Craig Leith stone, although it is not of the same hardness and specific gravity. The material of which Melrose Abbey is made is a very close sandstone of a yellow gray color. The grain is as fine as it can be from sand, but in point of durability, this, in my opinion is not at all inferior.

The cheapness with which the Cannelton stone can be worked gives it a very decided advantage. In short, we have, in the new mill here, furnished the best voucher of the character of this building material, and he who examines it must be very blind not to see its beauty and stability. Millions of tons of this material must soon be taken for building purposes to the towns and cities on the Ohio and Mississippi below this point. My foreman, Mr. Davidson, who is familiar with the best quarries in the United States and Great Britain, fully coincides with me in opinion. A. McGREGOR.

Mr. McGregor was eighteen years on the public works of the U. S. government and had charge of the construction of Fort Adams. His workmen on this building were chiefly Scotsmen who had been employed on the most important of the recently constructed public edifices in this country and in Great Britain. They all agreed in opinion that for convenience of access, ease of working, durability and beauty, this stone was not surpassed by any.

In 1848 Gen. C. T. James, of Providence, R. I. (who received his early instruction from Slater, the father of American cotton manufacture, and who has been engaged for the last fifteen years in putting cotton mills into operation in the most eligible positions in various portions of the country,) visited Cannelton and was at once forcibly struck with its great advantages. In a pamphlet published by him in 1849, he thus expresses his opinions:

"The convenient location of the spot for transportation—its close proximity to the cotton growing regions—its vast abundance of the best fuel in the country, and of every necessary material for building—its situation in the midst of a rich agricultural country—its command of the great valley of the Mississippi for a market—all these advantages, and others counected with them, make Cannelton the finest site for the manufacturing business in the Union; and fully justify the prediction that, ere many years have elapsed, it will become an extensive manufacturing city, not outrivaled even by Lowell

herself. Such a prediction may appear extravagant to some, but when it is considered that Lowell, with no peculiar advantages but her power, within about twenty-five years, has risen from a barren and unpeopled waste, to a rich and populous city, there can be no plausible reason assigned, why Cannelton, with a better motive power than Lowell has, and much more of it, and a thousand advantages that Lowell never possessed, should not advance with equally rapid strides. Such will be the fact—and if Cannelton does not, in thirty years from this time, outstrip the present Manchester of the United States, it will be because the people on the Ohio and Mississippi, had rather advance the interests of others than their own.

This, it strikes the writer, presents a grand field of operation for the people of the South, and more especially at the Southwest, at the present period, when it may be said that cotton manufacturing there is in its infancy. Establish a manufacturing city at this place, and it will serve as a beacon light to the people of the South, to direct their steps. It will also become a school, in which thousands will be taught to manage and direct the operations and business of the cotton mill, and from which, aid can readily be obtained at all times when wanted, at any other point. Such a place, by means of its almost inevitable success and prosperity, would exert a very great influence on the southern country, through its own practical example; and would, indirectly, cause many other similar establishments to rise up in various parts. It would continue to extend its ramifications in all directions, till the entire south had been awakened to the importance of the business and become a manufacturing country, as well as a cotton growing country. On this spot and in self-defence, should the Southern and Western agriculturists meet, and, by the combination of their means and their energies, make Cannelton what it is fully capable of being—THE great manufacturing city of the world.

To persons at all acquainted with the facilities afforded for the business of the cotton manufacture at the above named spot, and the details of the business itself, nothing need be added to what has already been said, to satisfy them of its admirable adaptation to the object in view. To others, however, a further explanation may be necessary. We would here remark—1. A very large proportion, nearly all, of the domestic cotton goods now consumed in the Mississippi Valley, find their way there from the East, either by the Lake route direct, or, by the way of New Orleans. The transportation, insurance, &c. by either route enhance the cost of the goods at least one-half per cent per yard. That additional cost per yard, on four millions and five hundred thousand yards per annum, the product of a mill of ten thousand spindles, will amount to $22,500. The cotton used at the east, must be transported from New Orleans or some other southern port, and provided there were no waste, the freight and expenses would be the same as on the cloth. But, for 4,500,000 yards of cloth, weighing about 1,600,000 pounds, it has been seen, a quantity of cotton is required, of 1,800,000 pounds. The freight and expenses on this, in the ratio of those on the cloth, would be $25,000; and which with the foregoing, makes the net sum of $47,500. Cannelton being situated in close proximity to the cotton growing country, it is very obvious that the expenses thus incurred to the Eastern manufacturer, on the raw material, will be saved to the manufacturer of the former place. As he also has a market for his cloth, at hand, a like saving on that article must be made too. The gross amount of $47,500 thus saved per annum, is about nineteen per cent on the entire capital of $250,000—a capital amply sufficient to cover the cost of the factory and its appendages.

At eastern manufacturing establishments, scarcely any requisite materials are found for building, with the exception of stone. Hence, large expenditures become necessary for the purchase of lumber, lime, brick, &c. &., at a distance, and to transport the same to the spot where wanted. But, at Cannelton, every necessary material is found at hand, at little or no expense, and requiring only to be brought into proper forms for use. for which, every facility exists. These local advantages must of course be of vast consequence, as they will greatly expedite the construction of such buildings as may be required, and save much of the expense usually incurred.

Again—the comparative trifling cost of steam power at Cannelton, is a desideratum not to be left out of the account; and to illustrate this fact more fully, we will give two or three estimates, made up from practical data, as follows: The cost of water power at Lowell, Mass. is five dollars per spindle. Hence, sufficient water power at that place to drive ten thousand spindles, is fifty thousand dollars, $50,000

Cost of foundations for a mill on the bank of a river, at a spot selected for the purpose, 20,000

Making up a total cost of $70,000

The interest on this, at 6 per cent per annum is $4,200
Transportation of 2,500 tons per annum at $1,25, 3,125
Cost of heating the mill, per annum, 2,000
Making the total cost of water power per annum for ten thousand spindles at Lowell, $9,325

A modern built mill will require, if constructed expressly for the manufacture of coarse cloths, a power equal to two hundred horses, to drive ten thousand spindles, with the requisite machinery. Thus, the horse power at Lowell would cost $46,62½ per annum. This we set down as within the actual cost of water power at Lowell. Let us now turn our attention to steam power. In this case, as in the statement relative to water power, we appeal to known facts.

There is in full operation at Salem, Mass. an establishment for the manufacture of cotton, known as the Naumkeag Mill. This mill contains thirty-one thousand spindles, and six hundred and fifty broad looms. The quantity of anthracite coal consumed, per day, is six tons; and this quantity is found ample to generate steam for motive power, for the mill and machine shop, warming the mill, offices, &c., making sizes, furnishing all the drying aparatus connected with making cloth, &c. In fact, the above is the entire amount of fuel consumed on the premises, for all purposes. The annual quantity consumed, is therefore 1800 tons; which, at $5 per ton costs $9,000
Engineer, firemen, repairs on engine, &c., &c., 1,500

Making the entire cost per annum, $10,500

The engine in the Naumkeag Mill is four hundred and fifty horses power, and working three hundred and fifty. Thus the actual cost is $30 per horse power, and less than the cost of water power at Lowell, by $16 62½—or, less than the water power at Lowell for ten thousand spindles, and the requisite number of looms, &c., by $3,324. To use steam however to the best advantage, the mill and engine should be large. A large engine operates with much greater power in proportion to its size, than a small one, or, in the technical language of scientific men, performs a much greater duty with a given quantity of fuel. In all small engines, necessity compels the adoption of the high pressure principle. In larger engines, that of low pressure is adopted; which makes a saving of at least fifty per cent in the article of fuel.

At Cannelton, the cost of steam power will be much less than it is at Salem. At Cannelton, coal of the best quality can be had at four cents per bushel; equivalent to $1 20 per ton. To run the Naumkeag engine at that place, with 1,800 tons of coal per annum, would cost, for fuel, $2.160; being $6,840 less than the fuel for that engine costs at Salem. The coal to drive a mill of 10,000 spindles, cannot exceed 1,000 tons per annum; which, at Cannelton, will cost $1,200. The pay of an engineer and fireman would be $1,000, and the cost of oil about $300 more; and making, together with the cost of coal, the comparatively trifling sum of $2,500 per annum, as the entire cost. In our estimate, we offset the cost of the steam engine, repairs, &c., against the cost of flumes, race-ways, water-wheels, wheel pits, &c., required for the mill driven by water power, though the original cost of the latter is greatest, and the former can be perpetuated and kept in repair at the smallest expense.

Cannelton is situated in the midst of a vast fertile region, yielding in great

abundance, all the usual products of the farm and the dairy, including large supplies of corn and wheat; and which are sold in market at prices much lower than similar articles in the markets of New England. Fuel, a very important item in the list of articles for domestic uses, may be had, as already stated, at less than one-fourth part of its cost in eastern towns by manufacturers; or at about one-sixth of the price paid for the article at retail. Under all the circumstances, probably it is not assuming too much to say that labor may be had there for manufacturing purposes, full twenty per cent lower than in New England, and yet all things considered, that operatives will be better paid. As labor constitutes much the greatest item in the cost of manufacturing, many thousands of dollars per annum will be saved in this way. We might, if necessary, enumerate many other advantages connected with Cannelton as a manufacturing place, such as its easy communication with other places, especially the important port of New Orleans, &c., but it is presumed enough has already been said on the subject to show that no other spot in the American Union, at least no one known, and occupied for manufacturing purposes, can compare with this for the prosecution of a safe and lucrative business. We will however add two or three other advantages, by way of inducement, to turn the attention of capitalists to this truly valuable spot. They are—first, persons who now contract for lots for manufacturing purposes, can rent coal land of the company, should they prefer to do so, at one cent per bushel of coal raised—and it will cost but two cents per bushel to raise it. Thus, as good coal as our country affords may be had at the very low rate of NINETY CENTS per ton! Second—for all buildings erected on the premises for a time, the company will *give* requisite quantities of sand, clay, stone and timber; and they will sell at low rates, fire-clay, sand-stone, and lime-stone, all of the best quality, and all found in abundance within the limits of the company's purchase. Third—there cannot be a reasoable doubt that this property will, now active operations have commenced, be doubled or trebled in value in the course of a few years. It therefore presents an opportunity, and such an one as seldom occurs, for a very safe and profitable investment of capital. We repeat the question—Should not the planters and capitalists on the Lower Ohio and Mississippi, combine their means and their energies to make this infant town, as a manufacturing place, what its situation and local advantages so eminently fit it to become? If they decline to do so, it must be because they do not properly appreciate the benefits to be derived from it.

MANUFACTURES OF IRON, POTTERY, GLASS AND WOOD.

With the exception of a thin stratum of about four inches of the Cannelton lower coal seam, this coal is not adapted to the forge; it has the heat and evaporative power, but does not "cake" and make a hollow fire. In the opinion of iron masters who have made experiments with it on a small scale, it is of sufficient purity and freedom from "clinker" to be used in a furnace without coking. If such should be fact, no position on the Ohio can compare with this for the manufacture of iron. One advantage compared with other places may be seen from the following statement:

A rolling mill, of $100,000 capital, will make about 3,000 tons of assorted bar iron and nails, and require about 225,000 of coal per annum—the number of men employed will average near 150.

For Western demand of iron we have the advantage over the East of cost of freights, cheap living, and cheap fuel. It is to be presumed that we cannot afford to buy Boston nails made of Pennsylvania iron and with Pennsylvania

and Nova Scotia coal; and it is doubted whether the central West will willingly continue to pay the extra cost of freight of 1800 miles on iron in the pig and the bar to and from Pittsburg and Wheeling.

The Cincinnati rolling mills doubtless pay a large profit, for, although they pay a higher price for coal than its cost at Pittsburg, the freight between the two points is saved and is more than an equivalent: but a large part of the iron made at Cincinnati passes the coal beds of the lower Ohio on its way to the consumer; for this demand a rolling mill, at one of these coal beds, would save say 450 miles of transportation and on the average at least 4½ cents a bushel on coal. or, for the mill of the size above, $10,125 per annum.

Nearly all the pig iron used at Cincinnati, and no inconsiderable part of that used at Wheeling and Pittsburg is from Missouri and Tennessee.

The price of this supply of pig iron depends on the cost of that part which comes from the points most remote and under the obvious rule that, where the home supply of any article is deficient in quantity, the cost of the deficiency fixes the price of the whole.

For the pottery business our coal and clays are peculiarly adapted—and have been fully tested between Cannelton and Troy at the works of Messrs. Casseday & Co. This business is new, and difficulties have been and yet must be met to obtain the proper labor and skill: yet it is one of vast importance and must soon be carried on to a great extent. It cannot be that we shall long continue to import common ware from Staffordshire at a cost of over 50 per cent for freight, 30 per cent duty, and over 30 per cent factorages, and pay for it in Indiana pork and wheat, when we have clays and coal as good and cheaper than the same materials in Staffordshire. For the finer fabrics of the potter we have feldspar in southern Illinois, kalin in Missouri, and silex in Arkansas, and all probably within a more limited circle.

Our coal is also remarkably well adapted for the glass maker, and, in the opinion of Mr. Ridgeway, we can easily find in the lower strata of our sand-stone the different sands required by the glass maker. The Wheeling and Pittsburg glass workers obtain all their lead and much of their sand and find their largest markets west of us.

For the manufacture of wagons, agricultural implements, furniture &c., Cannelton is at a convenient point for the collection of materials and the shipping of the products. The banks of the upper Ohio and its tributaries have been nearly denuded of valuable timber, while the forests on the lower Ohio are comparatively unculled. The demand for these articles for the southern market is enormous. The best of cherry, black walnut, oak, gum and maple lumber can be had in any quantities in this district at $10 to $14 per m., while the price in the Eastern markets is from $30 to $60 per m.

VALUE OF COAL LANDS.

We may approximate the value of the Cannelton coal beds by the answers of Mr. Geo. Ledlie, of Pittsburg, to queries made by me in 1847.

1. What is the price per bushel for mining coal in the vicinity of Pittsbu[r]

and on the banks of the Monongahela? Ans.—1½ to 2 cents per bushel.

2. What rent is paid by lessee of coal lands? Ans.—¼ to ½ cent per bushel, and when fixtures are found, ½ to ¾ cent.

3. What is the present value of these lands, and what increase of value in 10 years? Ans.—$400 per acre on the Monongahela between Locks 1 and 2
150 " " " " " 2 and 3
50 " " " " " 3 and 4
and the appreciation since 1837 about 100 per cent.

4. What is the average price of coal at Pittsburg, and what delivered on coal boats at the bank? Ans.—4½ to 5 cents at Pittsburg, and 3½ to 4 cents at the mouth of the mine.

5. What is the average thickness of the coal strata on the Monongahela? Ans.—From Lock No 4 down 4½ feet working coal.

The coal lands in the immediate vicinity of Pittsburg are chiefly owned by manufacturers in the city and a very high value is attached to them.

Pittsburg owes its manufacturing importance *entirely* to its coal beds. It imports its iron, fire-clay and sand. The nearest iron ore is found about 60 miles above, on the Alleghany River: the fire-clay is obtained on the Ohio, about forty miles below, and much of the sand is brought from Cape Girardeau on the Mississippi River.

The two following papers are by Hon. E. M. Huntington, Judge U. S. District Court of Indiana.

MANUFACTURING ADVANTAGES ON THE LOWER OHIO.

If, as is conjectured by some, the recent extensive failures in Great Britain have been chiefly confined to the manufacturers of cotton, and to those who as merchants, factors and bankers, have been connected in some shape with the cotton trade, it is very clear that they cannot bear up against American competition any longer. If the high price of provisions during the last year has affected the price of labor in their factories—which does not appear from anything we have seen, still, their remoteness from the raw material must far more than countervail any advantages they can ever have over us on the score of cheap labor, or the perfection of their machinery. Indeed, under the late improvements in machinery, the cost of manufacturing in this country has been greatly reduced: added to this the comparative cheapness of living, and, above all, the price of the raw material—having, as the English manufacturers do, three thousand miles of ocean transportation—it is impossible that they can ever again compete with us in this branch of industry. Under all the changes of our tariff laws, our manufactories have been steadily increasing, until they have acquired a solidity which no legislation can possibly shake.

But is the manufacture of cotton to be confined chiefly to the rugged hills of New England? To the minds of some of us, the day is coming when the valley of the Ohio will, so far as this great interest is concerned, bear the same relation to New England, that New England now

does to Great Britain. It is now settled incontestibly, that steam power, where coal is cheap, is cheaper than the cheapest water power for propelling machinery. This, then, is our position in the West. The great Illinois coal field touches and crosses the Ohio river, say 100 miles below Louisville. There, on either the Kentucky or Indiana side, for one hundred miles, may be found large quantities of the finest coal for steam purposes, which may be had at the river banks for four to five cents per bushel. In New England, where steam power is used—and that is the case in many of the most extensive and recently erected factories—the cost of coal is, on an average, full 20 cents per bushel; making a difference in our favor, in this single important item, of full three hundred per cent. Here, on the Ohio river, we are within ear shot of the cotton fields of Tennessee, Alabama, Mississippi, and Arkansas—on a river navigable at all seasons of the year—where provisions are, and always will be, cheaper than in any other part of the United States—in a perfectly healthy position, and as far south as is compatible with this important consideration. Add to this that we are in the centre of the great Mississippi Valley, where our market for the manufactured article is known to be the best in this country. With these manifest advantages over New England, why should we go there for our manufactured cottons? Or, rather, why should we not avail ourselves of our superior position and resources, and supply the markets of the world with cotton fabrics? Nor must it be overlooked that, for the manufacture of *iron* and *hemp* we possess the same natural advantages, viz: *the raw material and the moving power.*

Allow me to make another suggestion for the consideration of the South. It is certain that, at no distant day, a railroad communication will be established between the Southern Atlantic cities and the navigable waters of the West. This noble scheme of internal communication will connect the whole great Valley of the Mississippi with the Southern Atlantic sea-board; and when that is accomplished, it requires no prophet to foresee that the commanding ascendency of the Northern cities in the business of foreign importations and internal commerce, must be greatly impaired. It is impossible to estimate the effect which the opening of such a direct communication will have upon all the relations of the South and West. Is it not, then, in the present and prospective condition of the cotton trade, and of cotton manufactures, also clearly the policy of the South to foster the establishment of manufactories of cotton, iron and hemp, on the tributaries of the Mississippi? Not by the enactment of Tariff laws for protection—for Nature has given all the protection necessary—but by the investment of a portion of her surplus capital in these enterprises, whereby she will enlarge her market at home for the product of her cotton fields, and, in time, link indissolubly together these great interests of cotton production and cotton manufacture? Connected as we are by an immense extent of navigable rivers which flow into the Gulf of Mexico, our geographical affinities are all-powerful: and if, superadded to these, our interests are combined by the system of policy to which I have alluded, no agitations

growing out of Southern institutions can ever disturb this powerful sympathy. The Western free States, in the angry controversies between the North and the South, so much to be deplored, occupy *neutral ground;* but Nature, by those powerful arteries of commerce, our noble rivers, and by those immense coal fields which lie along the southern boundaries of the free States of Indiana and Illinois, and which, with the cotton of the South, constitute the *pabulum* of the most important manufacturing interests of the country, must forever, with preponderating force, throw the West and the South together.—*De Bow's Commercial Review*, 1848.

In the National Intelligencer, of the 13th of December, there is an able article on the subject of the "immense value of cotton manufactures to Great Britain." I should be glad to see it copied entire by every paper in the West, for the facts there stated are well calculated to set men to thinking upon this subject. The writer shows that, while the United States receives "only $35,000,000 for the growth, picking, bagging, carrying to market and selling, expenses of the cotton," Great Britain realizes "an accumulated value of $69,000,000 on its manufacture," or in the ratio of *two for one.*

In Porter's Progresss of the Nation, he says: "the rise and progress of the cotton manufacture in Great Britain, form, perhaps, the most extraordinary page in the annals of human industry." It is not necessary on this occasion to trace its early growth, or to describe the mechanical inventions, by means of which it has come to exercise so powerful an influence upon the destinies of the civilized world. Those who are curious to do this, are referred to the memoir of Mr. Kennedy on that subject, published in 1800, among the memoirs of the Manchester Library and Philosophical Society, to Mr. Baines's History of the Cotton Manufacture in Great Britain, and the Essay of Dr. Ure on the Philosophy of Manufactures. The manufacture of cotton cloth in England, may be said to have really commenced about the year 1800, for, prior to that time, Dr. Cartwright's Power Loom had not been practically applied to the weaving of cotton goods. From that period even to the close of the American War, the manufacture of cotton in England languished, but from the Peace of Ghent to 1840, it increased to an extent almost incredible, until now the manufacturing power of Great Britain constitutes the chief element of her political strength and national greatness. Strike from the realm of England her Manchester, her Birmingham, her Leeds and her Sheffields, and that power which has shaken the world for the last century would be gone. The armies and navies of Great Britain have penetrated the remotest parts of the earth; but the factories—the workshops of Great Britain, have furnished the very aliment on which they have existed. With her cotton and other factories, she has been able to force a commercial intercourse with every portion

of the world, savage and civilized—always taking good care to foster these great home interests by the most powerful protective policy.

In the last ten years American skill and capital have entered the field of contest with Great Britain, and at this moment the cotton manufactories of Manchester are sinking under the force of American competition.

And why is it, that for thirty-five years we have permitted a foreign country to snatch from us all the profit of manufacturing the cotton which grows upon our own soil? It is needless, now, to refer to the early struggles of our manufacturing interests. The vascillating policy of the government has rendered these interests, at times, somewhat insecure; but under all the changes of parties and policy, they have gradually acquired strength, until now they may be said to be almost independent of legislation. But had that liberal policy, which thus nursed them into an early maturity, been steadily pursued from the beginning, instead of sending $60,000,000 worth of cotton to Europe, to be manufactured at a profit of $120,000,000 to the manufacturers, we should now be manufacturing our own cotton, adding at least $100,000,000 per annum to our wealth, and with our cotton fabrics driving the English manufacturers from the markets of the world. In time, this will be the result, but it will not be so until the subject is examined and understood by the leading men of our country. *New* England has seen it, and how splendid are the results of her enterprize! Struggling early and steadily for the prize—in spite of all obstacles—pursuing with zeal and with confidence one uniform policy—rejecting the counsels of the timid, and resisting the influence of all hostile theories—she has succeeded in fixing these great interests upon firm foundations.

But while New England enterprize and industry have been struggling against the preponderating capital and cheap labor of Europe, what have we been doing in the great West, either for ourselves or for the country? Did Nature group together her finest productions in all their grand proportions in this great valley, for no other purpose than to excite the cupidity of strangers? With rivers running from the base of the Alleghanies on the east, and from the rocky mountains on the west to the Gulf stream, traversing for tens of thousands of miles the richest valleys in the world, she has blended together, in one vast combination, all the elements of an extended internal commerce, a most varied and unrivalled agriculture, and of manufactures the most profitable and the most splendid.

Portions of the west are teeming with the most valuable minerals, such as iron, lead, zinc, copper, &c., and with coal fields which surpass in richness and extent the finest coal measures of Great Britain.—Within the range of 500 miles of uninterrupted and connected river navigation, can be found the best cotton, iron and hemp country on this continent; and, within the same space, is also to be found the coal with which to manufacture these great materials into every form of which they are susceptible, for the use of man.

About one hundred miles below Louisville, on the lower Ohio, the

great Illinois coal basin crosses the river. There, this great and indispensable element of manufacturing power is placed in close proximity to the iron and hemp of Kentucky, Tennessee, Indiana, Illinois and Missouri, and to the cotton fields of Alabama, Tennessee, Mississippi, and Arkansas. The question is now beginning to be asked, "why is our cotton carried to Boston to be manufactured at the Lowell and Lawrence factories, and then sent back here for sale, when we have these manifest advantages over New England?" That steam is cheaper than water power is no longer doubted by any one who has examined the subject. *Here*, then, is the cheap moving power, for coal can be had for manufacturing purposes at 4 to 5 cents per bushel. *Here* is the raw material, and *here* is the best market. But this is not all, for *here* now and in all time to come, will the cost of living be less than any where else in this country. There are, on the lower Ohio, several points where, in process of time, these coal beds must be appropriated to manufacturing purposes. At Bon Harbor, Triplett and Barrett have already made a commencement. They are on the Kentucky side of the river, and perhaps occupy the best point for such purposes on that side. They have already erected a cotton factory, which has, by its complete success, more than vindicated their most sanguine views. The thing is no longer an experiment; their success is a "fixed fact."

On the Indiana side of the Ohio, as a prominent point, I will mention Cannelton, which is about thirty miles above Bon Harbor, and about 120 miles below Louisville. "The American Cannel Coal Company" own at that point some six or seven thousand acres of coal land. Although, for ten or twelve years past, inconsiderable quantities of coal have been dug there, it is only within the last five or six years that the business has assumed any degree of importance.

A part of this extensive property is now leased to James Boyd, Esq., late of Boston, under whose judicious and energetic management the business is rapidly increasing. He employs about forty hands in the mines (most of them Englishmen from the English coal districts,) and is selling to steamers from two to three thousand bushels per day. The coal resembles the Cannel coal of England, and is the very best known in this country for the generation of steam. It is placed on boats, and sold to steamers at 7 cents per bushel, and can be furnished there to manufactories at 4 cents. The coal beds are inexhaustible, as is proved by a thorough geological examination lately made, and increase in richness of quality and quantity the further they are worked. The position of the town (Cannelton) is extremely handsome, being on a plain, just above high water mark, on the north bank of the Ohio river, in Perry county, Ia., running back, with a gentle second swell, some 700 yards, to a line of hills in which is embedded this vast coal seam. The coal has a gentle dip towards the river, by which the mines drain themselves. Unlike the coal beds of England and Wales, which are found from 300 to 1500 feet below the surface of the earth, and worked at a vast expense and great hazard, here the entry into the mines is on a level, and the cars, which are drawn out by mules, are emptied from a platform

into cars below, which go by their own gravity to the river, where the coal is dropped into boats. The front on the river is beautiful, presenting, for several miles up and down, one of the most attractive landscapes which can be found from Pittsburgh to the mouth. The depth of the river on the side of the town is, for several miles, from 12 to 16 feet at low water, furnishing the very best possible river anchorage for vessels of every class. The neighboring hills are covered with fine timber for ship-building, there being an abundance of oak, locust. &c. Immediately on the river, at the upper end of the company's lands, the bluffs are filled with the finest building stone, easily quarried, and inexhaustible in quantity, where now the United States are procuring their stone for the government works at Memphis. Fire stone and fire clay are found there of good quality and in unlimited quantities. Added to all this, it is in a free State (which by some may be regarded as an important fact,) and is as healthy as any position west of the Alleghany mountains.

I will not say that this point presents *more* advantages as a manufacturing position than any other in the wide world, but it presents enough to render it prominent. It is impossible that these advantages can be long overlooked. If those who are most interested in the progress of Western manufacturers do not go forward, others will. New England enterprize and capital would long ago have appropriated these generous gifts had they been within their legitimate field of action; for, in spite of a capricious legislation—in spite of the high price of labor, the high price of coal, the high price of provisions, and the vast cost of transportation—New England, at this moment, is the acknowledged rival (if rival she has) of the greatest manufacturing power of the world, so far as the article is concerned.

How long will it be before we manufacture our own *cotton*, and *iron*, and *hemp*, and *wool*—how long shall we yield to Manchester the sixty millions of dollars annually for the manufacture of a single article, the profits of which legitimately belong to us—remains to be seen. Four hundred millions of dollars are invested in Lancashire, England, in the manufacture of cotton, while in our whole country, the amount employed in the same way does not probably reach fifty millions. In the West, with all our advantages over New England, we have scarcely made a commencement, and how long we shall yield to Lowell the profit of manufacturing what we can manufacture and prepare for market from 15 to 40 per cent. cheaper than she can, seems yet to be unsettled. The men are here qualified to go forward in this enterprize. A few have made a mere commencement, but the fears of the many are always apt to be stronger than their convictions. The capital is here, but it is hoarded up by the more cautious, or invested in business more familiar to us in the West than the business of manufacturing. This state of things cannot last, for when the subject is examined, every man will be convinced that the employment of capital here, in manufacturing, under good management, cannot fail to yield larger and most certain profits than any other business.—*Louisville Courier*, 1848. H.

The foregoing estimates show our advantages over New England for manufacturing. The following extracts from a paper in the Louisville Journal of August 8, 1849, show some of the advantages we possess over Great Britain:

In our discussions and legislation on our manufacturing interest, we have generally taken it for granted that at least a revenue tariff was absolutely required, to sustain the western mill owner; consequently, the impression has everywhere obtained, that manufactures, on a large scale (and it mattered not at what position in our valley,) must be unsafe depositories of capital, until the general policy of government could be fully ascertained and continuous protection relied on.

This opinion, almost universal here and abroad, must be wholly changed, before we can make rapid progress in the establishment of manufactures.

The foreign artisan will not leave a country where he does not require protection, for one where protection is required; he will not abandon certainty for uncertainty. And our own capitalists will not embark in a business, which, as they daily hear from the East, is subject to constant fluctuations and losses, until they are satisfied that they can place themselves on safer ground.

With the suggestion, that there may be some "method" in the complainings of our rich eastern brethren; that they may have had no desire to foster competition in a country where there are greater elements of manufacturing success than in their own; we proceed to show, that, in the home combination of food, iron, cotton, hemp, wood and wool, and in sections where the other element, power, can be obtained cheap, the western manufacturer is independent of foreign competition. We refer chiefly to coarse fabrics, and shall state the relative advantages of the counties of Lancaster, Staffordshire, and the West Riding in England, and of the counties of Perry and Greene, Ind., and Daviess, Crittenden and Caldwell, Ky.

We have to examine the relative cost of food, labor, power, materials and transportation.

It is difficult to classify the various items of subsistence, and to show the relattive cost of living in the respective districts. A man can exist on a penny a day in London, and perhaps in the cellar of the very house where parlor boarders pay a guinnea for every dinner. Equivalent quantities and qualities must only be regarded, and, without quoting largely from prices current, it is fair to fix on wheat, which is grown in perfection here and there, as the standard. Of this, our rate would not average 70 cents per bushel, while the English rate would average over $1,20 per bushel. The relative rents or value of equivalent land, free from taxation. and near markets equivalent in extent, would be ten or twenty to one in our favor.

Mr. Carey, in his work on political economy, gives ample proof that our labor, measured by its efficiency, is the cheapest, and the following quotation which we take from page 229 of 2d volume of Mills' Political Economy (the most recent English work on that science,) will save us the trouble of making further comparison on that point:

"In America, wages are much higher than in England, if we mean, by wages, the daily earnings of the laborer; but the productive power of American labor is so great—its efficiency, combined with the favorable circumstances in which it is exerted, makes it worth so much to the purchaser, that *the cost of labor is lower in America than in England.*"

Power.—In the strata of our central coal basin, which average about four feet in thickness, a good miner will dig and wheel, to the mouth of the drift, from 70 to 110 bushels of lump coal in ten hours; as the labor in these strata is healthy, safe, and not irksome, it is well paid, compared with our present prices of agricultural labor, at $1 25 per day; eighty bushels should cost say one and a half cents per bushel, besides rent, which, on the most favorable sites, is not over one cent per bushel; add one half cent, for profit to the contractor, and we have the cost of our best lump coals, at three cents per bushel, at the

furnace door of the mill or furnace, and directly on navigable streams, canals or railroads, by which these strata are cut.

These coals are, according to the report of Prof. Johnson, equal in evaporative power to the best English coals, the average cost of which, at the pit's mouth, is not less than ten cents per bnshel. The average price of lump coals at Newcastle, and for the last forty years, has been 12s. 1d. per ton, or a fraction over ten cents per bushel. The prices of the best coals at Liverpool have averaged $3 67 per ton, or say 13 cents per bushel.

It will be borne in mind, that the prices of coals in England have reached their lowest points; here the tendency of prices at the mines is downward.

Here there is a most important element (one which has made England what she is) at less than one-third its cost in the country from which, as is supposed, we *require* protection.

Cotton.—From the central cotton fields of the southwest, cotton can be laid down at the factories built and to be built up on the banks of the Ohio, in Daviess and Perry counties, as cheap as at New Orleans. The cost and charges of removing cotton from New Orleans to Manchester is not less, on the average, than one and a half cents per pound. Here we have an advantage of say twenty per cent, in obtaining the chief material of cloth.

As to this, our great staple—a staple in which we virtually have the monopoly—it is the height of absurdity to suppose that its manufacturers, 5,000 miles distant, can compete with us, even if we had no other advantage than the saving in transportation.

Iron.—We can find no tables of the actual cost of iron in England, and the prices are so fluctuating as to be an unsafe criterion. About 1835, the cost at Merthyr, Tydvil, in South Wales, is stated to have been £3 0s. 5d., and at Glasgow, £2 17s. 9d. per ton for hot blast cast iron. This cost has been reduced by the introduction of new and improved processes, which we have been slow in adopting, in consequence of the high cost of machinery and fixtures. A complete set of three furnaces costing, in England, about $100,000.

The clay iron stone of the coal measures is the chief ore smelted in England; and perhaps the position most favorable for this manufacture in that kingdom, is in the south of Staffordshire, where are associated the pit coal and iron ore, the limestone for fluxes and the fire-clay and fire-stone for construction of the furnaces. The crude iron-stone there rarely yields over its 30 parts in the 100 of ore. It is drawn up with the coal some hundreds of yards from the surface, and, notwithstanding the low prices of labor and capital, costs an average of 12 shillings a ton. The best quality of "*gubbin*," runs up to 16 aud 17 shillings. At 24 cents the shilling, the average stated is $2 88 per ton. the cost of lime-stone is about $1 44 per ton, and of coals, equivalent to ours, certainly over seven cents a bushel, or $1 96 per ton.

By the best processes that we have seen described for making hot blast iron, we may set down three tons of coals and one ton of lime stone for the ton of iron, and thus obtain the cost of the crude materials combined in that ton:

Iron stone, three tons, at $2 88	$8 64
Coals, three tons, at $1 96	5 88
Limestone, one ton	1 96
	$16 48

From the imperfect data before us, we thiuk that the cost of conversion, including labor, interest on capital, &c , &c., must be *at least* $3 32 per ton; making the whole cost $20 per ton

At the best iron works in New England, and with ore of about the same yield, the cost of convertion is not far from $5 50 per ton.

The price of Scotch pig iron in New York is now quoted at $18 per ton, duty paid; but we are uot advised of the losses or profits of the producer, or the quality of the article; and we cannot ascertain the cost of the crude materials.

In our western counties enumerated, we have iron-stone of greater purity, (ours averaging from 30 to 60 per cent,) pit-coal, fire-stone, fire-clay, and lime-

stone of as good quality. At our high prices of labor, and with our imperfect machinery and lack of system, in the very infancy of the manufacture here, our crude materials will average about thus:

Three tons of ore, at $1	$3 00
Three tons of coal, at $1	3 00
One tone of limestone, at 75 cents	75
	$6 75

against the Staffordshire cost of $16 48.

If charcoal is used, at a cost of three cents per bushel, and allowing 200 bushels to the ton of iron, we increase the cost of materials to $9 75 per ton, and we get a much better article.

At the furnaces erected on the banks of the Cumberland, and close by uncovered beds of rich iron-stone, the cost of the ore is said to be less than 75 cents per ton.

In the estimate of cost here, we put the *minimum* rates at the most favorable positions. It is more important to show what can be than what is done.

A very low cost of stone-coal iron in Scotland and Wales is stated to be 38s. ($9 16) per ton. Perhaps the average cost is over 42s. $10 08) when there are fair crops and no unusual scarcity of money in England.

The cost of moving a ton of pig-iron from Staffordshire (the heart of England) to the central cities of this valley, even if taken as ballast from Liverpool or Bristol to New Orleans, cannot be less than $8 per ton—making the whole cost here from $17 to $24 per ton, *without any duty*. Now, unless we have been grievously hoaxed in answer to our inquiries, pig-iron of greater value is now made on the Cumberland, the White and the Merrimack (Mo.) rivers, at less than $15 per ton, if not less than $12 per ton, and, at these positions, there are all the materials sufficiently abundant for the making of iron for a thousand years, and for the use of the world.

Such of our readers as wish to learn more of the details of the cost and making of iron, are referred to the works of Dr. Ure, R. C. Taylor, and the able paper of Mr. Hodge, published in the Railroad Journal.

Wool.—The grades of wool are so various, that the relative cost of equivalent kinds, in England, and on the Ohio, cannot be given (at least by us) with accuracy; yet we know very well that we have every variety of climate, soil and food, for sheep husbandry, and either on the sides of the Appalachian mountains or on the central prairies, we can produce every kind of sheep and wool of any fineness. We know that it must cost less to produce wool on our cheap lands, than on the costly and highly taxed lands of England and Belgium; and, if we should have to obtain full supply from the mountains of Spain or the pampas of South America, the average distance is not against us, and the natural attractions are greatest to our cheaper food and fuel.

Wood.—Here, of course, there can be no question of our advantages. From the building of a ship to the making of a cradle, we have the material at our doors, while England has to obtain her chief supply from the heart of Europe or this side of the rapids of the St. Lawrence.

Indeed, in the enumeration of the entire list of heavy and bulky raw material which a manufacturing people require, we can think of scarcely one in which we have not, or cannot easily have, a most decided advantage over England and every other country where are equal facilities of communication and interchange, and where the character of the people, the laws and the climate, are equally favorable to manufacturing pursuits.

Such are the general facts, and we could here rest our argument. But, as it is always easy to answer general statements by statements equally general, and, as the mass of readers will not take the trouble to analyze either, we will again recur to the cotton manufacture, which is, directly or indirectly, the chief source of employment to the manufacturing world.

For the correctness of our details, we refer to a pamphlet recently published by General C. T. James, of Rhode Island, whose statements on the subject will

not be questioned, and whose able letter ought to be studied by every western and southern statesman and capitalist.

A cotton mill of 10,000 spindles and corresponding machinery, for making coarse brown cottons, will require a fixed and working capital of less than $300,000; will operate with 43 men and 229 women and children; will require say 50,000 bushels of coal, and work up 1,800,000 pounds cotton yearly.

This cotton can be laid down at the mouth of the Tradewater, at Bon Harbor, or at Cannelton, as cheap as at New Orleans.

The freight, insurance, interest *in transitu*, wastage, commission, &c., from the New Orleans levee and through the cotton press, to Manchester, Glasgow, Lisle or Bruges, will average over 1½ cents per pound.

Our mill saves this, or	$27,000
Difference in coal in our favor over 4 cents per bushel,	2,000
Difference in starch, oil, wood, &c., &c., over	1,000
	$30,000

England has no advantages over us, in making those coarse fabrics, save in the abundance and low rate of her capital, and this is nearly or quite neutralized by her distance from the raw material and the necessary use of a greater capital in its conversion either in the hands of the ship owner, factor, or manufacturer.

But, for the argument, we will suppose that the Englishman only requires $300,000 for the mill; that he is satisfied with 4 per cent dividends, and we require 8 per cent. In this item, then, he has the yearly advantage of $12,000.

There is abundant evidence to show that the New England mills can make a pound of coarse cottons cheaper than their Manchester competitors; and there is abundant evidence that we can make up the same quantity cheaper than the New Englander—yet, as this question of wages is a stumbling block to our people who have not examined the subject, we will show the doubters the weakness of their doubts by supposing that our Ohio river mill will pay Lowell wages, and that the English mill owner can get his work done at half our prices. However, when we are clothing the English army in India, and against a differential duty of 15 per cent, this supposition would really seem absurd.

Well, at the Lowell rates, the yearly cost of the forty-five men at 80 cents per day, is, for

300 days,	$10,820
And of the 229 women and children, at $2 per week, for 52 weeks is	23,816
Or, total,	$34,136
One half of this is	$17.068
To which add the supposed difference against us in the use of capital, or	$12,000
And we have	$29,068

as the sum of the advantages of the English manufacturers, and less than the sum of our known and certain and *unchangeable* advantages of $932 per annum; and this, not for our home market, but for markets equally near to both. For our home markets, we have the further advantage of the cost of bringing four and a half millions yards of cotton, or over $45,000 per annum.

By the time that we have supplied our home market with the coarse cotton fabrics, we shall have the skill, machinery and capital, to produce these at a lower relative cost, and to compete with foreign manufacturers in the finer fabrics of cotton.

GENERAL LAW OF INDIANA RESPECTING CORPORATIONS.

Indiana Revised Statutes of 1843.—*Chap.* 32.—*Article* 2.

Sec. 14. All corporations shall, where no other provision is especially made, be capable, in their corporate name, to sue and be sued, appear, prosecute, and defend, to final judgment and execution, in any courts, or elsewhere;* to have a common seal, which they may alter at pleasure; to elect, in such manner as they shall determine to be proper, all necessary officers, and to fix their compensation, and define their duties and obligations; and to make by-laws and regulations, consistent with the constitution and laws of this State and the United States, for their own government, and for the due and orderly conducting of their affairs, and the management of their property.†

Sec. 15. All corporations may, by their by-laws, where no other provision is especially made, determine the manner of calling and conducting all meetings, the number of members that shall constitute a quorum, the number of shares that shall entitle the members to one or more votes, the mode of voting by proxy, the mode of selling shares for the non-payment of assessments, and the tenure of office of the several officers; but no such by-law shall be made by any corporation repugnant to any provision of its charter.

Sec. 16. The first meeting of all corporations shall, unless otherwise provided for in their acts of incorporation, be called by a notice signed by any one or more of the persons named in the act of incorporation, and setting forth the time, place, and purposes of the meeting; and such notices shall, seven days at least before the meeting, be delivered to each member, or published in some newspaper of the county where the corporation may be established, or if there be no newspaper in the county, then in some newspaper of an adjoining county.

Sec. 17. Such corporation, when so assembled, may elect officers to fill all vacancies then existing, and may act upon such other business as might by law be transacted at regular meetings of the corporation.

Sec. 18. Every such corporation may hold lands to an amount authorized by law, and may convey the same.

Sec. 19. All corporations whose charters shall expire by their own limitation, or shall be annulled by forfeiture or otherwise, shall nevertheless be continued bodies corporate, for the term of three years after the time when they would have been so dissolved, for the purpose of prosecuting and defending suits by or against them, and of enabling them gradually to settle and close their concerns, to dispose of and convey their property, and to divide their capital stock, but not for the purpose of continuing the business for which such corporations have been or may be established.‡

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* A corporation legally created in any one of the states may sue in the courts of this state. *The Guaga Iron Company* v. *Dawson*, 4 Blackf. 202.

A party contracting with a corporation is estopped from saying that they were not at the time a corporation. 2 Blackf. 367. But a party is not estopped from denying that the corporation existed at the time the suit was brought. 4 Blackf. 202.

The declaration in a suit brought in a corporate name need not aver the plaintiffs to be a corporation. *Harris* v. *The Muskingum Manufacturing Company*, 4 Blackf. 267.

† The whole corporation is answerable, so far as its franchises are in question for the misconduct of the president and directors, or other select body in the management of the concerns under their control. *Bank of Vincennes S. B.* v. *The State*, 1 Blackf. 267.

‡ The debts due to or from a corporation are extinguished by its dissolution; its lands and tenements revert to the grantor and his heirs, and its goods and chattels become vested in the state. *Bank of Vincennes S. B.* v. *The State*, 1 Blackf. 267.

A plea in abatement to an action by a corporation, that the charter is forfeited in consequence of a mis-user or non-user of the franchises cannot be good, unless it show the forfeiture to have been judicially declared in the instance of the government. *John et al.* v. *The Farmers' and Mechanics' Bank of Indiana*. 2 Blackf. 367.

A plea to a suit by a corporation, stating that the corporation had been dissolved by the acts of its members, without showing the causes and manner of the dissolution, is insufficient. *Harris* v. *The Muskingum Manufacturing Company*, 4 Blackf. 267.

As to a judgment against a corporation in case of a forfeiture, the effect of such judgment, &c., see *Bank of Vincennes S. B.* v. *The State*, 1 Blackf. 267.

SEC. 20. When the charter of any corporation shall expire or be annulled, as provided in the preceding section, the circuit court of the county in which such corporation carries on its business. or has its principal place of business, on application of any creditor of such corporation, or of any stockholder or member thereof, at any time within the said three years, may appoint one or more persons to be receivers or trustees of and for such corporation, to take charge of the estate and effects thereof, and to collect the debts and property due and belonging to the corporation, with power to prosecute and defend, in the name of the corporation or otherwise, all such suits as may be necessary or proper, for the purposes aforesaid; and to appoint an agent or agents under them, and to do all other acts which might be done by such corporation, if in being, that may be necessary for the final settlement of the unfinished business of the corporation; and the power of such receivers may be continued beyond the said three years, and as long as the court shall think necessary for the purposes aforesaid.

SEC. 21. The said court shall have jurisdiction in chancery of such application, and of all questions arising in the proceedings thereon, and may make such orders, injunctions, and decrees thereon as justice and equity shall require.

SEC. 22. The said receivers shall pay all debts due from the corporation. if the funds in their hands shall be sufficient therefor, and if not. they shall distribute the same rateably among all the creditors, who shall preve their debts in the manner that shall be directed by any order or decree of the court for that purpose; and if there shall be any balance remaining after the payment of said debts, the receivers shall distribute and pay the same to and among those who shall be justly entitled thereto, as having been stockholders or members of the corporation, or their legal representatives.

SEC. 23. If there shall be no person entitled to receive the same. or any part thereof, it shall be paid into the state treasury, to be disposed of in such manner as the general assembly may at any time direct.

CHARTER OF THE AMERICAN CANNEL COAL COMPANY.

AN ACT to incorporate the American Cannel Coal Company;

SECTION 1. *Be it enacted by the General Assembly of the State of Indiana:* That Seth Hunt, John D. W. Williams, James T. Hobert, J. B. Rupell, Elijah Livermore, and their associates, successors and assigns, shall be and they hereby are created and incorporated a body politic and corporate by and under the name and title of the American Cannel Coal Company, for the purposes of mining for stone-coal at Coal Haven, in the County of Perry, and elsewhere in said county, and also for iron ore and other materials, and for manufacturing iron, copperas and lumber, and building steam and flat boats for the transportation of coal, lumber, iron and other products, and by the aforesaid name, may prosecute and defend suits at law and equity, have a common seal, choose all necessary officers, and make and establish such by-laws, rules and regulations as they may deem necessary and expedient for the management of the business and the government of the interests and concerns of the said company: *provided*, the same be not repugnant to the constitution and laws of this State and the United States.

SEC. 2. *Be it further enacted:* That the said Company may purchase, receive, hold and enjoy, lands, coal, iron and other mines, rents, tenements, mills and manufactories, furnaces and forges, steamboats and other water craft, goods, chattels and effects, to the amount of three hundred thousand dollars to be divided into shares of one hundred dollars each, with liberty to increase the capital stock to five hundred thousand dollars, should the business of said company require it, and the same to sell, convey and demise, and generally, with power to do and perform all acts and things, and have, exercise and enjoy all the rights,

immunities and privileges pertaining to companies legally incorporated: *provided*, that all the estate, real and personal, held and owned by said company, shall be held liable to assessment and taxation in the same manner as if the same were held and owned by an individual.

Sec. 3 *Be it further enacted:* that the business of the said company shall be mining for coal, iron ore and other materials, the manufacture of the same in their various branches, the manufacture of copperas, sawing, and manufacturing flour and lumber, building steamboats and other water craft, mills, furnaces and forges, and in transporting coal, iron lumber and other products from Coal Haven and other places, to New Orleans and elsewhere, as may be most advantageous to the business and interests of said company.

Sec. 4. *Be it further enacted:* That the business of said company shall be carried on by one or more general agents, to be duly appointed by and to be under and subject to the direction and control of three (3) directors of said company, to be annually chosen by the stockholders of said company. Said directors shall be chosen annually on the first Monday in May, by ballot, from among the stockholders, who shall hold their offices for one year, and until other directors are legally chosen by a majority of the votes given, either by the stockholders present or by written proxy from those not present, and each stockholder shall be entitled to one vote for each share which he or she may hold in the capital stock of said company. The persons, or either two of them, mentioned in the first section of this act may organize said company, but the first election shall be holden in Coal Haven, in Perry county, aforesaid, on the first Monday of May next, or sooner if required by a majority of the stockholders, and John D. W. Williams, James T. Hobert and J. B. Russell, or either of them are hereby authorized to receive subscriptions to the stock of said company, and at such times and at such places as they may deem expedient after the passage of this act, which subscriptions shall be paid at such times and in such manner as the board of directors shall ordain and direct, and any two of the persons named in this act may act as judges and managers of said first election, but at each subsequent annual election, the acting directors shall act as judges and shall manage and conduct said elections, and said directors shall elect one of their number to act as president of said board of directors, and in case of a vacancy of one of said board by death or otherwise, the remainder of the board of directors shall have power to fill said vacancy. The majority of the board shall form a quorum capable to transact the business of said company, and the said directors shall have full power and authority to carry into effect all the designs contemplated in the act of incorporation.

Sec. 5. *Be it further enacted:* That the said company may acquire by agreement and contract with the owners and proprietors of lands the right of way for the purposes of having roads from their coal mines to the Ohio river, and they may make and improve all such roads in such manner as may be most advantageous to said company. The said company may also acquire such ware-houses and lots as may be required for storing their coal, lumber and other products of their several works and for the better enabling them to carry on the business in its various departments.

Sec. 6. *Be it further enacted:* That the President and directors of said company shall appoint one treasurer and one secretary to keep the funds and accounts and record the proceedings of said company, and the books of the said company shall at all times be subject to the free inspection of any of the stockholders, and should a majority of the said stockholders require it, a true and just statement of the accounts, property and business of the said company shall be annually published by said treasurer and secretary, duly certified by the President and directors, and the said President and directors shall from time to time make and pay, or cause to be paid to the stockholders, such dividends of the profits, as the condition of the said company will justify, without diminishing the capital stock of said company.

Sec 7. The said company shall not engage in any species of banking business, or issue bills payable to bearer, in the form or nature of bank bills, nor issue checks for money deposited in banks or elsewhere other than in actual payment of debts.

SEC. 8. The stockholders in said company shall be respectively liable for any debts due by or damages accruing against said company during the time they are such stockholders respectively, to the amount of ther stock, and no further, and in proportion to the amount of their stock, so severally held to be recovered by a suit in equity: *provided*, that before such liability shall attach as aforesaid, there shall be a return *nulla bona*, or not a sufficiency to satisfy an execution issued against said company.

SEC. 9. A violation of any of the provisions of this act shall forthwith be in law a forfeiture of all the corporate powers thereof.

SEC. 10. This act shall be, and the same hereby is, declared to be a public act, for the purposes herein specified, and shall take effect, continue, and be in force during the term of fifty years from and after a certified copy thereof shall have been deposited in the clerk's office of Perry county, unless the said company shall sooner be voluntarily dissolved by a vote of a majority of the stockholders, of which public notice shall be given by the President and directors of said company, who shall file a copy of said notice in the clerk's office of said county of Perry, and cause the same to be published in the newspaper in Indianapolis, in which, at the time, the laws of the State are officially printed; and in the event of the voluntary dissolution of said company, before the expiration of the period of its termination by this act, the President, directors and stockholders shall be allowed two years to settle and close the accounts of the said company, in the same manner and with the same powers as though the President, directors, and stockholders were still a corporate body.

THOS. J. EVANS,
Speaker of the House of Representatives.
DAVID WALLACE,
President of the Senate.

Approved December third, eighteen hundred and thirty-seven.

DAVID WALLACE.

STATE OF INDIANA, }
Secretary's Office. } ss.

I, Wm. J. Brown, Secretary of State for the State aforesaid, do hereby certify that the foregoing is a true and faithful copy of the original enrolled bill now on file in this office.

In testimony whereof I have hereunto set my hand and affixed [L. S.] the seal of the State, at Indianapolis, this twenty-third day of December, A. D. 1837.

WILLIAM J. BROWN,
Secretary of State.

AN ACT to amend "an act to incorporate the American Cannel Coal Company," approved December 23, 1837.

SEC, 1. *Be it enacted by the General Assembly of the State of Indiana:* That the American Cannel Coal Company, created by the act to which this is an amendment, be, and they are hereby authorized to increase their capital stock to an amount not exceeding one million of dollars, in shares of one hundred dollars each, whenever they may deem it advisable; *provided*, said increase of capital stock is necessary for the bona fide transactions of said company.

SEC. 2. Said company may subscribe stock in other manufacturing companies or corporations to the extent and value of land privileges and materials furnished by said American Cannel Coal company to such other manufacturing companies or corporations.

SEC. 3. The directors of said American Cannel Coal Company shall, after the next annual election of directors and officers thereof, consist of not less than five nor more than nine members of said company, to be chosen in conformity to the provisions of the act to which this is an amendment, the number to be determined on and chosen at the said next annual election.

SEC. 4. Said company for the purposes of raising money to improve their property, by the construction of roads, streets, wharfs and railways thereon

and for any other purposes connected with the legitimate operation of the company, shall have a right to issue their bonds, bearing interest at not exceeding ten per cent per annum, payable semi-annually, payable at a period not greater than twenty years from the date of their issue; which bonds shall operate as a lien upon the rents and profits of the property of said company from the maturity of said bonds, or the coupons for the interests thereon respectively; *provided however*, that no such bond or bonds, shall be issued as aforesaid, except upon a vote of three-fourths of the stockholders in interest of said company, and no bond shall be issued for a less amount than five hundred dollars.

SEC. 5. Said company shall have the right, by a vote of two-thirds of the stockholders in interest, to subscribe stock in companies or corporations created in other States.

SEC. 6. This act to take effect and be in force from and after its passage.

G. W. CARR,
Speaker of the House of Representatives.
JAMES H. LANE,
President of the Senate.

Approved January 21, 1850.
JOSEPH A. WRIGHT.

STATE OF INDIANA:

I, Charles H. Test, Secretary of State for the State of Indiana do hereby certify the foregoing to be a true full and complete copy of the within recited act as appears from the enrollment on file in my office.

In witness whereof I have hereunto set my hand and affixed the [L. S.] seal of the State, at Indianapolis, this 29th day of January, A. D. 1850

CHARLES H. TEST,
Secretary of State.

CANNELTON, a post town in Perry county, four miles below the mouth of Deer creek and six above Troy, at the mouth of Anderson river. It now contains 600 inhabitants; but the indications of its rapid growth are evident from the superiority of its position and the richness of its beds of coal, fire-clay, building stone, &c. During the last two sessions of the Legislature, ten charters, with an aggregate capital of several millions of dollars, were obtained for manufactories at this point, presenting as it does, in the opinion of practical and scientific men, advantages for the manufacturing of cotton, iron, hemp, wool, glass snd stoneware, not found in any other place in combination. The coal in the hills immediately back of the town, is of the best quality, is inexhaustible and easy of access, and is underlaid by excellent fire-clay. In the same hills, fire-stone and sand stone, of a superior quality for building, are found in great abundance; and near the bank, common clay and sharp white sand in large deposites. The vast influence which steam is to exert upon the growth of the manufacturing skill and industry of the great Western valley, deficient as it is in water power, and the immense importance that will be attached to coal for the supply of the fleets of steamers that will bear its commerce over its long diverging avenues of trade, extending from points thousands of miles asunder, and requiring voyages equal in length to the passage of the Atlantic, will make coal deposits a subject of deep interest to the statesman, and to all who have an interest in the prosperity of these favored regions. Most bountiful is the supply of mineral wealth to this richest seat of nature's munificence, and doubtless will equal the most extended use which her other gifts can ever demand.

The section of the coal seam at Cannelton increases in thickness in the interior, as where it is cut by the White, Eel and Wabash rivers, it is from six to ten feet thick.

Map of
CANNELTON
PERRY CO. IA.
Surveyed and drawn by
CHAS. A. FULLER.
U.S.C. Eng.
ENGRAVED BY
CROSVENOR & THOMPSON
CINCINNATI
EXPLANATIONS
1 Churches
2 Cannelton Cotton Mill
3 20 Tenements for Factory
4 Factory Landing
5 Stores
6 Saw & Grist Mill
7 Indiana Cotton Factory
8 Coal Depots
------ Coal Rail Roads
Scale 2000 ft to 1 Inch
COAL BEDS
Boyds Coal Mines
McLean Coal Mines
Cattlebury Ct
MASONS
DOZIER CL
MASON
FACTORIES
SITES FOR FACTORIES
OHIO RIVER

The importance of this coal field to Indiana, the wealth that is to be dug out of her hills, so long overlooked, the home market that will here be made for our agricultural products, the capital and population which will be attracted from abroad by this affluent combination of manufacturing advantages warrant the anticipation that Cannelton, at no distant day, may become a large and important manufacturing city.—*Chamberlain's Gazetteer of Indiana*, 1849.

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This town was first laid out in 1835, and settled by colliers under the supervision of Rhodes and McLane. In 1836 the American Cannel Coal Company was formed, which owes its origin to the late Gen. Seth Hunt, of New Hampshire; a man whose intelligence was only equalled by the energy of his character, and who, in connection with Messrs. Hobart, Williams and Russell. then wealthy capitalists of Boston, purchased a large tract of land, consisting of about 7000 acres, and made several entries to the coal strata. The capital stock of this company is $500,000. From 400,000 to 500,000 bushels of coal is mined here per annum. The site of this town is on a bend of the Ohio, and embraces over 1000 acres between the river and the coal hills. The landing is very fine. The principal improvements and growth of Cannelton have taken place within the last twelve months. Its population is now somewhere between 1200 and 1500 persons.

The most extensive improvement in the place is the Cannelton cotton mill. The Indiana cotton factory, which is represented by figure 7 on the map, is not yet commenced, although the stock of the company is taken. and the building will be under way in a few weeks. In addition to the church already erected, a Presbyterian church is to be put up during the present season, besides a Catholic chapel. A large first class hotel, containing over 70 sleeping rooms, is now being constructed, and will be ready for occupation by the last of May. Besides the saw and grist mill of J. C. Porter & Co.. referred to on the map, the cotton mill company have already in operation a fine steam planing mill, and connected with the same power, several circular saws, turning lathes, &c. The establishment of Mr. Z. W. Merrithew, for the manufacture of shaved shingles, is also worthy of notice. A short distance above Castlebury creek, and upon the bank of the river, Messrs. Ross, Talbott & Co. are erecting a large saw and flouring mill. Just below the mouth of Dozier creek. Mr. Thomas M. Smith is about building another saw mill. A building has already been erected by Messrs. Smith & Badger for a foundry, but is not yet in operation. The tin, copper and sheet iron establishment of J. S. Thayer & Bro. is well known to the community. Recently our friend Beacon has commenced the manufacture of brick, and in a short time will be ready to fill all orders in this respect. We have some eight or ten stores of different kinds, and a full supply of professional gentlemen. We have bakers, butchers, shoemakers, tailors and milliners.

The Rev. Mr. Whitworth preaches to us every Sabbath, and Mrs. Whitworth will open a school for the education of females on the first of next month. A Sabbath School is duly organized and in successful operation, with a large number of pupils. There are two private schools in the place, kept by Messrs. Jones and Gardner. A division of the order of the Sons of Temperance is established here, and quite recently a very respectable number of lads entered the ranks of Total Abstinence, under the title of "Cadets," and are fighting manfully against the use of intoxicating liquors. The zeal which they manifest in the cause is worthy the imitation of older people. An association for the diffusion of useful knowledge and the establishment of a circulating library has been formed and a few volumes purchased, which it is hoped will induce the spirit of reading, and result in a large acquisition of useful books, by which still more good may ultimately be accomplished.

We have thus briefly referred to the most important improvements of our town, although in our remarks we have said nothing of the private dwellings now being erected in all parts of the village, nor of others that we know are to be erected during the present season.—*Cannelton Economist*.

AN ACT to incorporate the Cannelton Cotton Mill.

Be it enacted by the General Assemby of the State of Indiana: That C. T. James, E. M. Huntington, Hamilton Smith, S. P. Chase, James Boyd, Jacob Beckwith, Thomas M. Smith, James Low, Randall Crawford, Pearly Chamberlain, and John N. Breden, their associates, successors, and assigns, be and they are hereby made a corporation, by the name of the *"Cannelton Cotton Mill,"* for the purpose of manufacturing cotton and other goods, at the town of Cannelton in the county of Perry, Indiana, and for this purpose shall have all the powers and privileges, and be subject to all the duties and requisitions contained in the statute of 1843, Chapter 32, Article second, respecting corporations.

Be it further enacted: That the capital stock of said corporation shall not exceed five hundred thousand dollars, and that the said corporation may be lawfully seized and possessed of such real estate as may be necessary and convenient for the purposes aforesaid, not exceeding the value of fifty thousand dollars exclusive of buildings and improvements that may be made by the corporation.

This act shall take effect and be in force as a public act during the term of fifty years, from and after its passage, unless said corporation shall sooner be voluntarily dissolved by the stockholders, of which due public notice shall be given.

(Signed,) WILLIAM A. PORTER,
Speaker of the House of Representatives.
PARIS C. DUNNING,
Speaker of the Senate.

Approved, Feb'y 15, 1848.
(Signed.) JAS. WHITCOMB.
Originated in the House of Representatives,
(Signed,) M. S. WARD, cl'k.

STATE OF INDIANA:

I, John H. Thompson, Secretary of State, for the State aforesaid, do hereby certify that the foregoing is an entire and correct copy of an act entitled an "Act to incoporate the Cannelton Cotton Mill," taken from the original enrollment, now on file in my office. In testimony whereof, I have set my hand, and affixed the seal of the State, at Indianapolis, the 15th day of February, A. D. 1848.

JOHN H. THOMPSON,
Secretary of State.
By W. R. STRANGE, Deputy.

The Cannelton Cotton Mill, was fully organized on the 22d of Sept., 1848, by election of the following officers and directors,

DIRECTORS;

WILLIAM RICHARDSON, Pres.	ALFRED THRUSTON, Treas.
CHARLES W. SHORT,	WM. F. PETTIT.
LEWIS RUFFNER,	JAMES C FORD,
PEARLY CHAMBERLAIN,	T. C. COLEMAN,
OLIVER J MORGAN, of Carroll Parish, La.	WILLIAM McLANE, of Bedford, Ind.

HAMILTON SMITH, Secretary.

Ten other charters similar to this in form and for different manufacturing purposes in Perry county are under the control of the Coal Company, and are offered, free of charge, to companies who may select this county for their operations.

CANNELTON MILL CANNELTON.

The *Cannelton Cotton Mill*, for 10,800 spindles and 372 looms, is 287 feet long and 65 feet wide; or 282 by 60 feet in the clear. Towers 106 feet high. The attic, 220 by 40 feet, is lighted by windows in the roof, and gable ends. Corner stone laid May 21, 1849. Engine in the basement near the left wing.

This edifice is now complete and is receiving its machinery. The chimney, 100 feet high, stands at a distance of 20 feet from the left wing and is made of cut stone, corresponding with that in the main building.

It is believed that this is the best, and, (all things considered,) the cheapest cotton mill of the size in the United States.

Its outline and finish give it the appearance of an extravagant work, but the cheapness with which the material is obtained and worked (7 cents per superficial foot. "bed and build" for dressing); the great solidity and durability which is required for heavy machinery, and here obtained by large blocks of stone, and the convenient uses to which the towers are put, make it an economical building. There is, of course, the greatest effectiveness and the least deterioration of machinery in the most solid building, and the profits of a cotton mill depend very much on the permanency and effectiveness of the machinery.

In one of the towers are wide and easy stairways that secure entire safety for operatives in every room in case of fire; in the other are water closets opening into each room, and between are large doors through which machinery, furniture, &c., can be received into each story. Perfect ventillation is obtained by a draught from each room downward through the water closets and vault and by a tunnel from the vault to the bottom of the chimney. This connection is opened at the close of work, morning and evening, and the draught is sufficiently powerful to draw the floating particles of cotton in the attic downwards and then upwards through the chimney. Thus the ornamental parts of the building have been made subservient to the useful.

The mill is heated by steam pipes, and eventually will be lighted with gas; the fire apparatus is connected with the engine, well, cisterns in the rear, in the attic and in the tower. Sufficient hose will connect with water plugs in each room. The well is 14 feet in diameter, and as is believed, will give an ample supply of water at all times, but to guard against all accidents, large cisterns in the rear will be kept full of water. Cheap fuel will enable the company to keep up a head of steam during the night sufficient to set the fire apparatus at work in a few minutes. In the right wing is the agent's office and the willow and picker rooms in the basement, and in the other wing the boilers, office and cloth rooms. The roofs are covered with tin; the cornices and guttering are of stone; the main building and wings are as near fire-proof as practicable. A fire-proof warehouse for cotton and cloth is to be put up in the rear of the mill.

The plans and arrangements of the mill were made by Gen. C. T. James, of R. I., and reflects great credit on his taste and skill. He is also contractor for the entire machinery, most of which was made at the well known establishment of W. Mason & Co., Taunton, Mass.

The factory fronts the Ohio River, and is situated upon a lot comprising about eight acres, and is distant from the river bank about 300 yards. It is entirely above all inundations, and for pleasantness of locality cannot be surpassed. Large and commodious boarding houses for the accommodation of the operatives are being erected near the mill, under the superintendance of Mr. Bucklin, of Providence, R. I. The machinery is now being placed in the mill, and will be completed during the summer. The overseers, engineers, machinists, and a large part of the operatives have been and will be selected from the best mills in New England. In a few months, as is believed, this mill will be turning out as large a product as any similar mill in the world.

LIST OF STOCKHOLDERS OF CANNELTON COTTON MILL.

Cannelton Cotton Mill.—It has been shown that Cannelton has *superior natural advantages* for a manufacturing city to any other of which we now have any knowledge. To develope these advantages, we only require the aid of men of character, intelligence and capital. To

show that such men are already enlisted with us, we subjoin a list of the stockholders of the Cannelton cotton mill:

William Richardson, Dr. Charles W. Short, Hamilton Smith, Lewis Ruffner, Pearly Chamberlain, Wm. F. Pettit, Alfred Thrnston, Robinson, Peter & Carey, Robinson & Brothers, Joseph S. Morris, Edwin Morris, Thomas C. Coleman, James C. Ford, E. Hutchings, Col. Thomas Anderson, Robert G. Courtnay, James E. Breed, Col. Stephen H. Long, T. G. Richardson, Jacob Beckwith, Samuel L. Nock, John L. Martin, Thomas E. Wilson, Willis Ranney, Wm. A. Richardson, and Charles H. Lewis, Louisville, Ky.; James Boyd, Hon. E. M. Huntington, and J. B. Smith, Cannelton, Ind; Col. William McLane, Bedford, Ind.; Hon. Rob't Dale Owen, and Dr. David D. Owen, New Harmony, Ind.; Randal Crawford, New Albany, Ind.; Hon. O. J. Morgan, Carroll Parish, La.; Hon. Henry Bry, Monroe, La.; Dr. M. J. Sellers, Providence, La.; Hon. Maunsel White, and F. Y. Carlile, New Orleans, La.; Rt. Rev L. Polk, Thibodeauxville, La.; Col. Wm. L. Campbell and Hon. Francis Griffin, Greenville, Miss.; David Hunt, Rodney, Miss.; John Hutchins and R. M. Gaines, Natchez, Miss.; Charles T. James, Providence, R. I.

The above list is unquestionably the strongest of its kind ever got up in the Missisippi valley. There is not on it the name of a "speculator." Every name on it is that of a man of substance, who has mouey to invest every year. Most of these names represent men of fortune, who have made their estates by habitual thrift. They have not taken hold of this thing to make a fancy stock, but to make a permanent investment. If this mill meets their expectations, they are able and will be ready to build another. Indeed, we have no question but that they are able to build and put in operation such a mill as this out of their annual surplus income, and we know that Messrs. Ford, Martin, Hunt, Bry, Morgan, Campbell. Griffin, Gaines, and Hutchins, could furnish a full supply of cotton to this mill, out of their surplus crop. The officers of the company, who receive no emolument from their offices, own about $100,000 of the stock. The contractor for the machinery has not only invested over $30,000 in and about the mill, but has invested therein his reputation as a manufacturer and mill builder. He has pledged himself to make this mill the best (i. e., most productive) of the kind in the world, and has stated that Cannelton is the best position now known for the establishment and operation of a cotton mill.

Of these stockholders one is Col. S. H. Long, the distinguished head of the U. S. Topographical Bureau in the West, who is justly regarded as the ablest and most experienced civil engineer in America. Another is Hon. R. Dale Owen, who was once a co ton manufacturer in Scotland, and whose extended observation in all the important manufacturing districts of the world fully qualifies him to judge of our advantages. Another is Dr. D. Dale Owen, whose geological information, practical and scientific, is unsurpassed. To these high authorities we refer for the truth of our statements as to the superior advantages of our position.

The Louisville stockholders are among the most promiaent and successful business men of that city, and are familiar with every department of Western finance, trade and commerce.

In short, these stockholders are men who do not engage in any enterprise without due consideration, and who are sure to accomplish whatever they undertake, They are men not to be discouraged by petty obstacles, and cannot be diverted from their well considered purposes by the doubts of ignorance or the opposition of other interests. There is a certainty that they will make all that can be made out of their advantages and operations here.

[*Cannelton Economist.*

The INDIANA COTTON MILL, with a charter and capital similar to that of the *Cannelton Cotton Mill*, has been organized and will be put in operation as soon as practicable. This will make coarse goods, such as blankets, tickings, &c. James Boyd is President of this company.

Immediately below Cannelton a town has been laid off by a company of Boston capitalists. The site of this town is favorable, the river privileges excellent, and the coal lies convenient. From the energy and means of the gentlemen engaged in this movement, it will doubtless be attended with large results.

Still further below, and near Troy, Messrs. S. Casseday, W. Garvin, Wi Bell, E. T. Bainbridge and P. Chamberlain, have a valuable site and mineral rights over an extended surface. Their charter, the *Indiana Pottery Company*, is of the most favorable character. This company commenced operations in 1838, but in consequence of difficulties in obtaining operatives from England, suspended operations after a year's trial and rented its property. James Nixon is the present lessee, and now employs 10 hands in making coarse ware.

The opinions of these gentlemen, in connection with the statements of distinguished manufacturers, geologists and engineers in the pamphlet, are, as is believed, sufficient to sustain the high claims of Cannelton as a most favorable site for manufactures.

H. S.

LAFAYETTE, July 4, 1850.

DEAR SIR: I acknowledge the receipt of the pamphlet entitled "Cannelton, &c." I appreciate the facts most fully, and, with an intimate knowledge of the resources of that section of our State lying on the Ohio River, I hesitate not to recommend to the attention of capitalists the undertakings you have there commenced. If manufactures can flourish in the United States, they must succeed at Cannelton, where there are so many advantages in abundant raw material, economical power, and facilities for labor.

Respectfully Yours,

H. L. ELLSWORTH.

HAMILTON SMITH, ESQ.

NEW HARMONY, Ind., June 17, 1850.

Sir:—I have received, and read with pleasure, your pamphlet on the Natural Advantages for manufacturing of Cannelton, and heartily concur in the general correctness of the facts and inferences therein presented.

As early as the year 1838, when engaged, as Geologist of Indiana, in an examination of her Mineral resources, I expressed the opinion that, here, as in England and other portions of Europe, on the coal measures the true basis of successful manufacturing enterprise and industry; and that on the margin of our coal formation is to be found what may emphatically be termed the mineral region of this State. These considerations point to Cannelton and a few other locations in its vicinity, on the eastern margin, also to a narrow belt between Shawneetown and the mouth of the Cumberland, on the western margin of the great Illinois coal field, as the most promising sites on the lower Ohio, for manufacturing and mining purposes.

Potter's clay, and especially fire clays, are commonly found associated with those argillaceous strata which embrace the best seams of coal; and this, in an economical point of view, is no inconsiderable item.

I am, Sir, your ob't serv't,

D. D. OWEN.

I concur in the views above expressed by my brother, Dr. Owen.

ROB'T DALE OWEN.

To HAMILTON SMITH, Esq.,
Louisville.

LOUISVILLE, July 5, 1850.

SIR: The topographical surveys made by me at and near Cannelton, gave me a full opportunity of examining the advantages of that locality for manufacturing purposes, which, as I think, are correctly stated in the foregoing pamphlet. Taking into view the depth of water along the

shore, the elevation of a large portion of the town site above the level of the highest freshets, the character of its building materials and the abundance and convenience of its bituminous coal, I am decidedly of the opinion that the resources of Cannelton for manufacturing purposes are superior to those of any other position in the West of which I have any knowledge. Respectfully, your obedient servant,

CHAS. A. FULLER,
United States Civ. Engineer.

To the President of the Am. Can. Coal Co.

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Louisville, July 5, 1850.

I fully concur in the opinions expressed by Capt. Fuller in the foregoing note. Several years since, Gen. Armistead, Surgeon Gen. Lawson, and myself, were directed by the Secretary of War to examine the country adjacent to the navigable rivers of the West, with a view to the selection of the most suitable site for a Western armory. The nature, character, and extent of supplies of all kinds, required for carrying on manufacturing operations, were objects claiming our particular attention. The means of procuring the requisite mechanical power, and especially the relative economy of water power and steam power, were carefully investigated. The results obtained, in this last respect, showed conclusively, that steam power, generated by the combustion of bituminous coal, at ten cents per bushel, would be more economical, as well as more manageable in all respects, than water power, at any site that could be found within the extensive region examined. These results together with numerous others relating to supplies of all kinds, commercial facilities, centrality of positions, &c., &c., were communicated to Congress through the War Department, early in 1843. (See House Doc., No. 441, 1844.)

The site selected was that of Fort Massac on the lower Ohio. In the estimation, particularly of Gen. Armistead and myself, the advantages centering at this point, all things considered, were greater than those that could be brought to bear on any other site, by reason mainly, that all needful supplies could be brought hither, from the vast region drained by the Ohio, upper Mississippi and Missouri rivers, by descending navigation. While the fabrics manufactured thereat, could be distributed thence through navigable channels, to all parts of the vast region situated between the Gulf of Mexico, and the northern boundary of the United States.

With respect to the economy of steam power at Cannelton, the consumption of bituminous coal for its maintenance, to the fullest extent required for manufacturing operations, will be less than one half of that adopted as the standard of comparison in arriving at the results above mentioned; while the facilities of obtaining provisions and raw materials of all sorts at this locality, though slightly less considerable in some respects, are quite equal in others, and in very many instances superior to those that can be had at Massac, or any other point on the Western waters, as you have shown with sufficient clearness, in the statistical views of the foregoing pamphlet. Very respectfully, sir, your ob't serv't,

STEPH. H. LONG,
Superintendent W. R. Imp'ts, &c

To Hamilton Smith, Esq., Louisville, Ky.

1833